July 12, 1943

STEEL

The Magazine of Metalworking and Metalproducing

ESTABLISHED 1882

The BAILEY BLAST FURNACE CLAY GUN

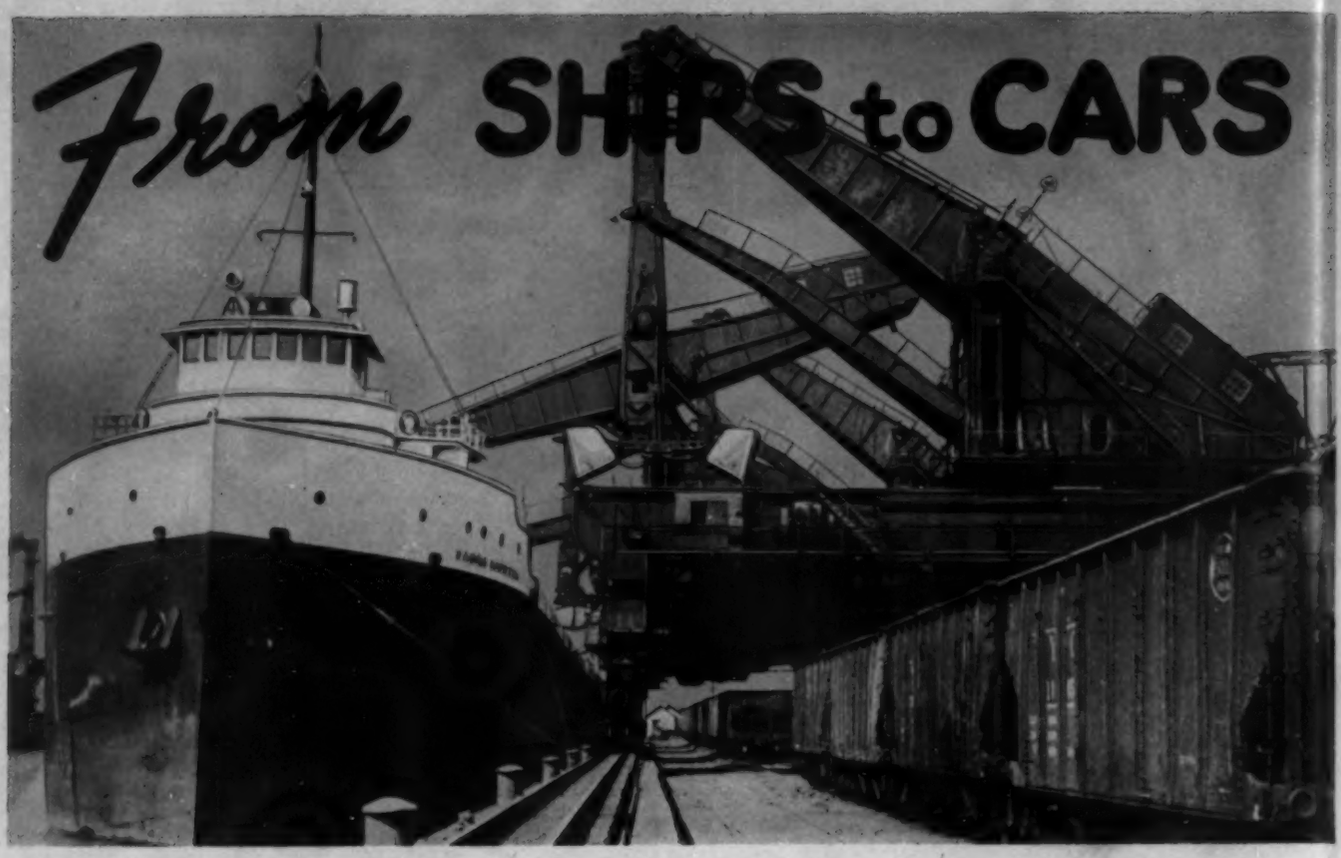
FOR WAR BUSY BLAST FURNACES

America's WAR PRODUCTION GUN

ITS DEFINITE PATH AND POWERFUL ACTION ALWAYS STOPS THE TAPPING HOLE

WILLIAM M. BAILEY COMPANY Engineers PITTSBURGH, PENNSYLVANIA

Leadership Through Quality



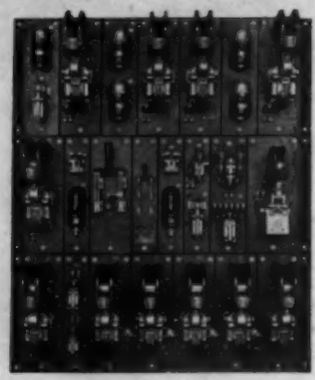
EC&M Control *speeds* ORE MOVEMENT

IN HULETT Unloader work, the distance the load travels is relatively short (a round trip from boat-to-hopper-to-boat requiring as little as 48 seconds time). EC&M *LINE-ARC* Magnetic Contactor Control fulfills the requirements of this *high speed operation* in an outstanding manner.

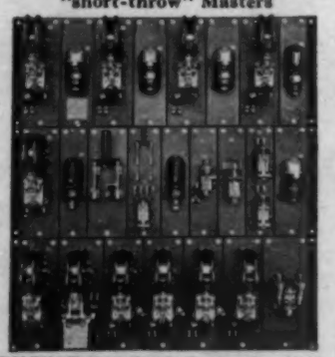
First, EC&M quick-responding *LINE-ARC* Magnetic Contactors permit almost instantaneous movement of the Bucket, Beam or Trolley motions when the operator manipulates his Master Switch. This means greater maneuverability for "clean-up" as well as faster operation for normal unloading.

Second, the *LINE-ARC* principle controls the arc so that contact-life is materially increased and there is no destructive burning of the arc shields. The result is low up-keep cost, due not only to fewer replacements but also to less inspection.

Before purchasing control for ore unloading or ore handling machines, we invite your investigation of EC&M Magnetic Control which uses the *time-saving, economically-operating* *LINE-ARC* Contactors.



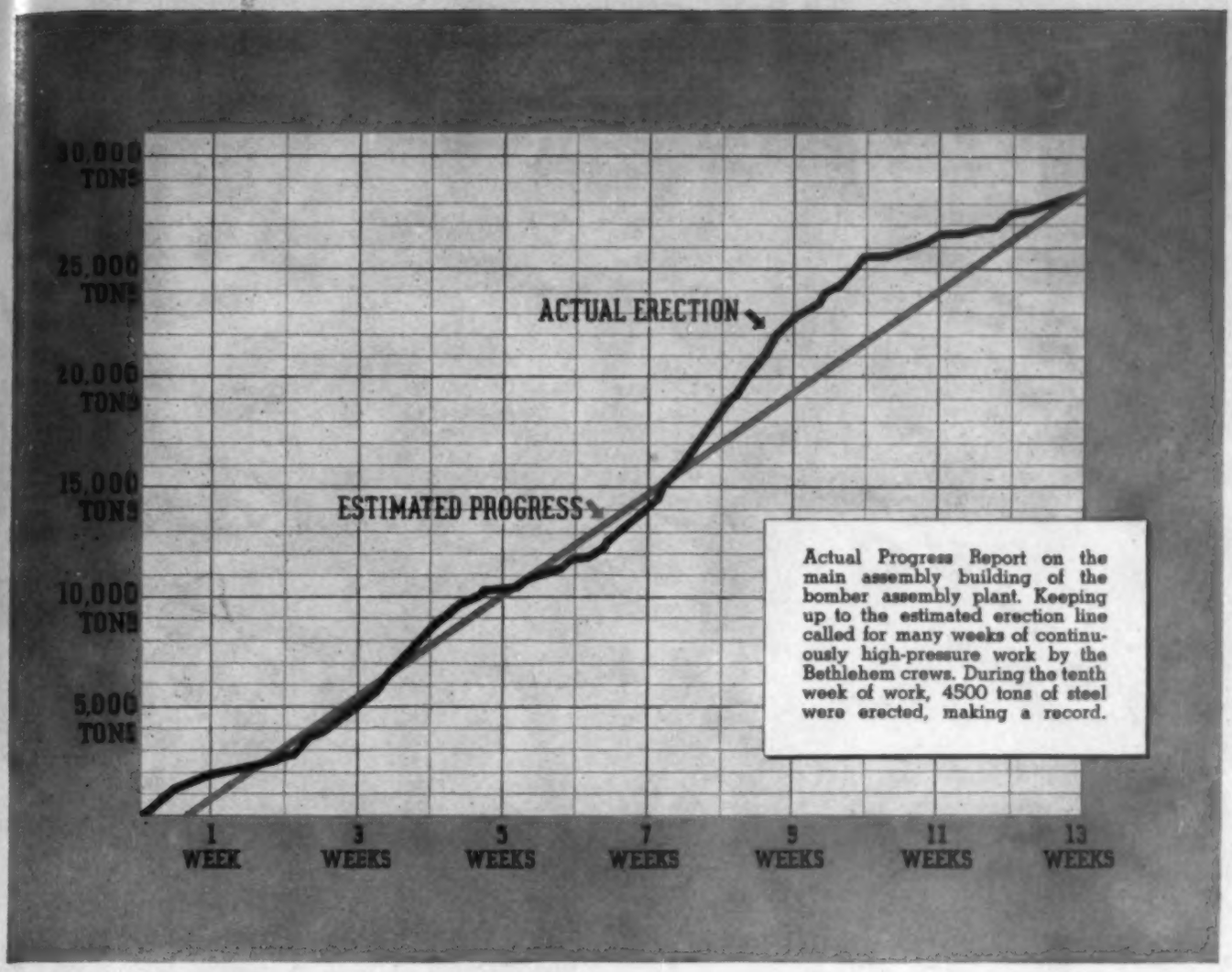
Reversing-plugging, dynamic braking TROLLEY Controller. All controllers operated by "short-throw" Masters



Typical BUCKET-CLOSING Controller of the reversing-plugging, dynamic braking type for Hulett Unloader

THE ELECTRIC CONTROLLER & MFG. CO.

CLEVELAND, 4 ★ OHIO



Actual Progress Report on the main assembly building of the bomber assembly plant. Keeping up to the estimated erection line called for many weeks of continuously high-pressure work by the Bethlehem crews. During the tenth week of work, 4500 tons of steel were erected, making a record.

4500 tons of steel erected in a week

Bethlehem's erection crews have set another record in putting up the steelwork for one of the largest war plants in the nation, a bomber assembly plant covering 47 acres, somewhere in the Southeast.

The job called for fabricating and erecting the steelwork for five separate buildings. The largest structure, the main assembly building, is 1020 ft. wide by 2000 ft. long. The 28,119 tons of steel that went into this building were put up in 81 working days, or 2082 tons per 6-day week. In one week 4500 tons of steelwork were placed.

The week-by-week story of the work on this main assembly building is told on the progress report above. Note how closely and consistently the line of actual erection follows the line of estimated progress. And how the Bethlehem crews, after getting their second wind, got way ahead of estimated progress during the latter half of the job.

This huge bomber assembly plant is one of a large number of key war production plants fabricated and erected by Bethlehem. All of them have been constructed under full throttle. For a bomber, a tank, or a ship today may well be worth ten tomorrow.

BETHLEHEM STEEL

Check Your CENTER of GRAVITY!

A Shaper is the center of gravity of the balanced tool room and die shop. Cincinnati Shapers are accurate, powerful, responsive. In batteries in the large plants, or singly in the small shop, Cincinnati Shapers give outstanding value

Write for Catalog N-2

THE CINCINNATI SHAPER CO.

CINCINNATI OHIO U.S.A.

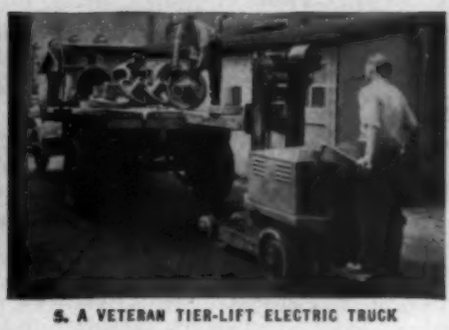
SHAPERS BRAKES SHEARS

1. TIER-LIFT ELECTRIC PLATFORM TRUCK

2. 20-TON CAR HANDLING FOUNDRY FLASKS

3. SPECIAL LARGE CAPACITY CORE-OVEN CAR

4. 2-TON RUBBER-TIRED PLATFORM TRAILER



5. A VETERAN TIER-LIFT ELECTRIC TRUCK

6. RUBBER-TIRED STOCKROOM TRAILER

7. PLATFORM TRAILER WITH STEEL WHEELS

8. LOW-LIFT TRUCK PUSHING PLATFORM CAR

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10. LOW-LIFT ELECTRIC PLATFORM TRUCK

11. 5-TON PLATFORM CAR, TIMKEN BEARINGS

12. OPEN FRAME TRAILER, 5000 LBS. CAPACITY

ANYTHING ON WHEELS

All of these cars, trucks and trailers are serving *one* manufacturer — an Army-Navy 'E' plant. *All of them were engineered and built by* EASTON. Still, they show but a few of the hundreds of different types of EASTON handling equipment which are moving the materials for War Production. Here is a wealth of 'know-how' that makes EASTON your material handling headquarters. For information on modern, efficient handling methods for all types of raw materials, parts, finished products or waste, write to: Engineering Counsel, Easton Car & Construction Company, Easton, Pennsylvania.

A-1002

EASTON
INDUSTRIAL CARS
TRUCK BODIES · TRAILERS
ELECTRIC LIFT TRUCKS

BEHIND THE SCENES

The Answer To the Tardy Soldier

■ In case you're still wrestling with the tardy soldier from last week, give up and get back to work. He overstayed his leave 46 2/3 minutes. We finally peeked and here's the answer: In just two hours the minute hand would be in the same place as it started and the hour hand would have advanced 2/12ths of the way around the dial. But the hands had exchanged positions which would require travel over 10/12ths of the dial for the two hands. The minute hand moves 12 times faster than the hour hand, so it would go 12/13ths of the distance, or 46 2/3 minutes.

Pay that lady an NE Steel Selector and Handbook!

Radio Convention

■ The travel and hotel situation being what it is, conventions of all kinds are having their troubles, although many are registering all-time highs in attendance. But in order to keep its members on their jobs in wartime production the National Association of Foremen has come up with a really new idea for its September get-together.

They will stage the first national convention by radio that has ever been held. Throughout the country member clubs of the association will hold local meetings at which they will listen to a network program of one hour, with speakers of national prominence discussing questions of pertinent interest. Then each group will proceed with localized discussions by association members and other industrial leaders.

D' Guys Who Melt D' Steel

■ Our poetry corner has been sagging a bit lately but Ernest S. Richardson in the Planning Division of the Washington Navy Yard rushed in last week to fill the breach with this little tribute to the guys who melt the steel:

On a hot day in mid-summer
When the temperature starts to soar
And you know you've finally reached the point
Where you can stand no more.
Think nothing of it, Brother,
'Tho the heat to you is real.
Let me tell my little story
'Bout the boys who melt the steel.

Why, the world's worst torture chamber
And the hottest place on earth
Is that misplaced spot of Hades
That is called an "open hearth".
If you'd know the torture of the damned
If you'd know how Hell will feel
Join the guys up on the platform
Of a furnace full of steel.

When your body's wet with sweating,
And your clothes are white with salt,
When your spirit still is willing
But your body cries out, "Halt!"
When you feel that you are blistered
From your head down to your heel,
Then you're in there fighting, Mister,
'Gainst a furnace full of steel.

When heat devils start to dancing
On all objects far and near
And you'd trade your place in Heaven
For an ice cold glass of beer.
When you curse the God that made you
And gave you such a deal
Then you know the pain and torture
Of the guys who melt the steel.

Yes, I know the job is brutal
And it isn't any fun
But it's vital to the nation
As a job that must be done.
So go on cool off, Brother,
And let your blood congeal.
For today's just like an ice-box
To the guys who melt the steel.

Battleship Tan

■ The new slogan is "Join the Navy and Get a Suntan"—at least if you are lucky enough to get on the new Battleship, U. S. S. NEW JERSEY. In addition to all the instruments of destruction, orders have been placed for installation of group solarium type ultraviolet ray lamps to be set up below decks for the men who would otherwise be denied much of natural benefits of sunshine.

Both U. S. and British submarine crews have for some time been provided with ultraviolet irradiation, as have workers in many blacked-out British factories where it has been found helpful in reducing absenteeism. Similar lamps are also specified for our newest aircraft carriers.

Absent One Day a Month

■ Speaking of absenteeism, the figures for March, issued by the National Industrial Conference Board, are staggering—43,520,000 man-days; up over four million man-days from February, and an average of .9 days for each man and 1.3 days for each woman.

Global Map by Alcoa

■ We certainly hope the Aluminum Co. of America printed up a sufficient supply of their global maps because we're sure the demand will be terrific. It would be very smart to get your request in right away.

The Real McCoy

■ Mr. D. B. McCoy, who as announced in STEEL June 28 has been appointed general sales manager of the Steel Co. of Canada, Ltd. writes:

I am one of your paper's best supporters from the standpoint of interest. I think your resume of conditions in the United States is not approached by any other trade paper with which I come in contact.

Vol. 113, No. 2, July 12, 1943. issue of STEEL, published every Monday at Cleveland, Ohio. Entered as second class matter at the post office, Cleveland, O., under act of March 3, 1879. U. S. and possessions, Canada, Maxico, Cuba, Central and South America, 1 year $6; 2 years $10; all other countries, 1 year $12. Current issues, 25c. Yearbook of Industry issue, $2.00.

Editorial Contents—Page 61

Why every company has an obligation to make post-war plans now

SOME people think post-war planning now is somehow unpatriotic, premature, the wrong use of time.

The government doesn't think so. They are working on demobilization plans, conversion to peace, and yet not letting it interfere with prosecution of the war. Everyone can and should do the same, because . . .

What sort of welcome will it be for our soldiers if they come home to closed factories, with "No Help Wanted" signs —factories shut down while they're being converted to peacetime products?

As part of its post-war program, every factory should plan on providing as many good jobs as possible for efficient workmen. To provide good jobs, a factory will have to compete successfully in the peacetime world. To compete successfully means you must provide goods at a cost low enough to attract buyers. To keep your costs that low means you must provide your workmen with every possible means of eliminating waste and keeping down cost-per-piece. And that means the most efficient machine tools possible.

Plan now, and set aside the dollars, for the new Warner & Swasey Turret Lathes and other machine tools you'll need to keep your post-war costs low. Modern Warner & Swaseys can cut turning costs as much as 50% below many old-time rates. That means broader markets for your goods; and *that* means you'll provide more post-war jobs. Right there is reason enough to do your post-war planning *now.*

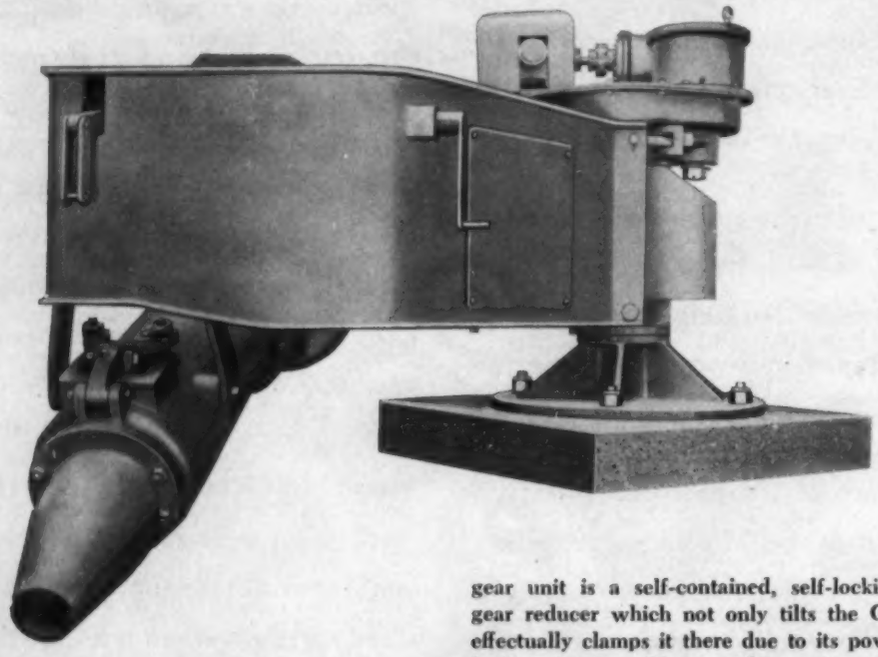
YOU CAN TURN IT BETTER, FASTER, FOR LESS... WITH A WARNER & SWASEY

WARNER & SWASEY
Turret Lathes
Cleveland

THE BAILEY ELECTRIC PLUNGER CLAY GUN
FOR BLAST FURNACES

THE BAILEY ELECTRIC PLUNGER CLAY GUN is of the plunger type and is supported by an independent pedestal anchored to a concrete foundation. The Clay Gun is a self-contained unit consisting of a large clay barrel and a plunger actuated by a motor-driven power screw. This unit is suspended from a carriage which in turn is supported on a pedestal sleeve revolving about a fixed pedestal post. The Gun is swung into position on the tapping hole by two independent motions controlled by two separate motor drives. The first motion swings the gun carriage about 180° in a horizontal plane into position in front of the tapping hole by means of a drive on top of the pedestal. The carriage is automatically locked to the furnace front in this position by means of a latch. The second motion lowers the Gun from a horizontal position down into the tapping hole and forces the nozzle into the hole by means of a powerful drive mounted inside the carriage. The power is transmitted through a heavy crank lever which supports the Gun. The nose is guided down to the hole by means of two suspension levers fastened to the front of the clay barrel. The Gun is held in position on the tapping hole by a self-locking worm gear so that it can not back away while the plunger pushes the clay into the hole. The plunger is actuated by a power screw driven by a motor through a helical gear drive.

The complete equipment has three separate and independent motions which are: first, the swinging of the carriage around the pedestal and automatically locking it to the furnace front; second, the tilting and forcing of the Gun into the hole; third, driving the plunger to extrude the clay. Only one motor is operated at any one time.



THE CARRIAGE:

The Carriage, from which the Gun is hung, swings horizontally about a stationary pedestal post. The Gun is supported on the carriage by a large crank arm which extends under the barrel to a bearing at about the center of gravity of the Gun. The front end of the Gun is supported by a pair of levers which are hinged to the front of the carriage near the top. These levers also serve as guide levers, which together with the rear crank supporting arm determine the path of the nozzle. Owing to the particular arrangement of the front levers and the crank supporting arm, a straight line motion of the nozzle is obtained as it enters and leaves the tapping hole.

This arrangement of levers also brings the Gun up to a horizontal position, parallel with the floor when the Gun is in the "up" position. The crank supporting arm is fitted to a large shaft which operates in bearings mounted in the carriage frame. The crank supporting arm and shaft is actuated by a gear segment which meshes with a pinion mounted on a worm gear unit located on the inside of the carriage frame. This gear unit is a self-contained, self-locking worm and helical gear reducer which not only tilts the Gun into the hole but effectually clamps it there due to its powerful action and self-locking feature. The complete unit is oil and dust tight and is mounted in the carriage frame in such a way as to be accessible and can be easily removed as a unit. The motor for driving this part is mounted in the carriage frame directly in front of the gear unit, where it is protected from the heat and the splash of cinder or iron.

The Carriage frame is manufactured into a one piece box section by the welding of heavy steel plates and is ruggedly designed to withstand severe shock and stresses encountered in continuously plugging the tapping hole with blast on the furnace. This design of carriage provides a substantial mounting for handling the Gun, and provides great strength and positive action of its tilting and clamping mechanism. An automatic coupler or latch on the front of the carriage locks the Gun carriage to the furnace when the Gun is swung over the iron trough. The operation of the coupler itself is automatic and the carriage is securely connected to the furnace front until released by the Operator after the tapping hole is plugged. Only after the carriage is latched to the furnace front, does the Operator tilt and force the Gun into the tapping hole.

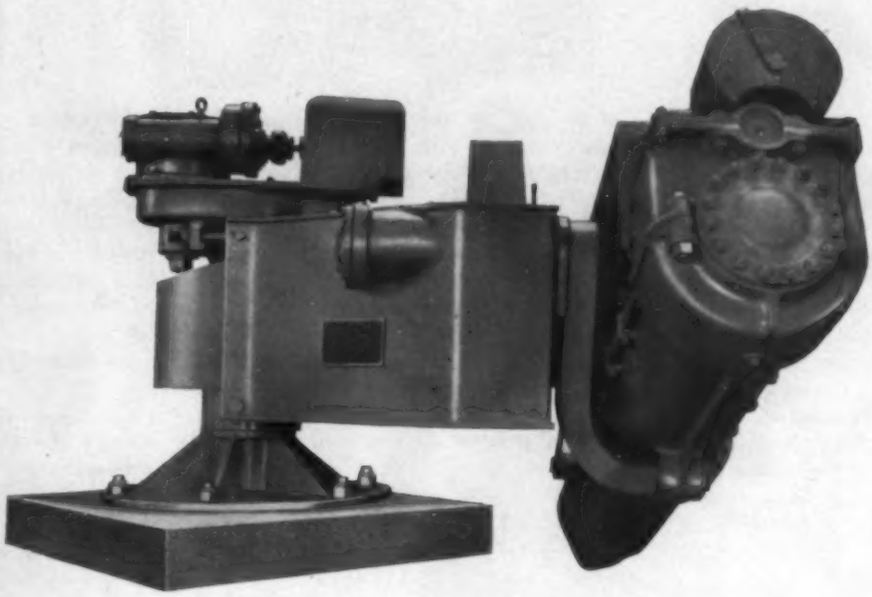
WILLIAM M. BAILEY COMPANY · *Engineers* · **Pittsburgh, Pa.**

THE BAILEY ELECTRIC PLUNGER CLAY GUN

THE PEDESTAL:

The Pedestal around which the carriage swings is mounted independently of the furnace, leaving the furnace front clear and free of all obstructions which interfere with tuyere changes, work at the tapping hole and the like. The pedestal consists of a solid steel post securely anchored to the foundation. Around this post is a rugged outer sleeve which rotates on heavy roller bearings at top and bottom. The carriage is mounted on the pedestal by means of two trunnions at the lower end of the pedestal sleeve and two adjusting bolts at the upper end.

The carriage and pedestal sleeve are swung around the post by a motor driven gear unit mounted at the top of the pedestal. The swinging mechanism consists of a large spur gear keyed to the top of the fixed pedestal post, with a mating pinion driven by the vertical worm gear shaft. An automatic heavy duty clutch is inserted between the pinion and worm gear to protect the drive from heavy overload. This clutch also acts as a brake by stopping the carriage gradually when the motor is stopped or suddenly reversed.

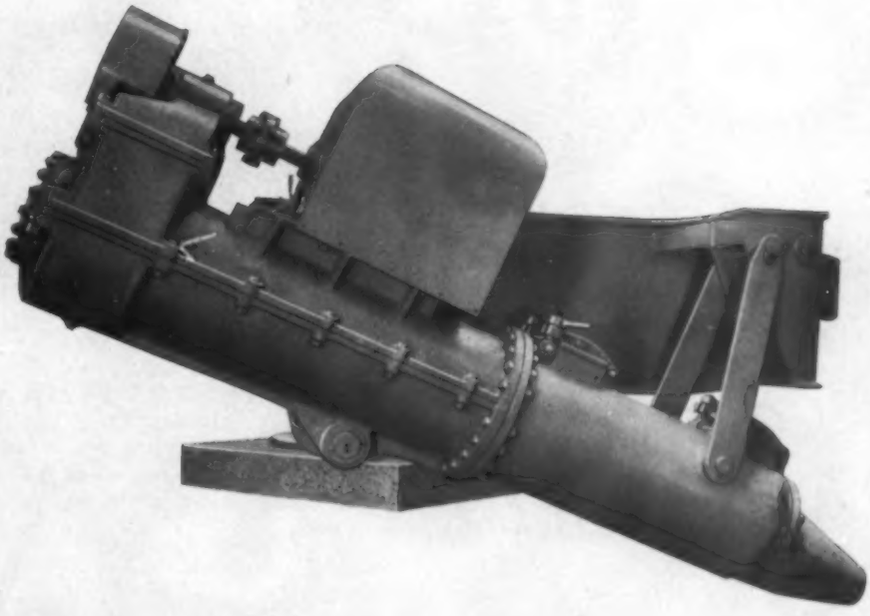


Built under U. S. Patents

1,780,485 - 1,726,069
1,726,070 - 1,774,373
1,852,559 - 1,852,560
1,852,561 - 1,852,562
1,852,563 - 1,852,564
1,852,565 - 1,881,478
1,881,479 - 1,989,799
2,101,306 - 1,825,734

Other Patents Pending.

This Gun will stop the tapping hole with full wind on the furnace at every cast. Continuous movement of the stock, due to the constant wind pressure, produces a smooth operating furnace with a steady flow of gas to the stoves, fewer tuyere changes, less flue dust and increased tonnage.

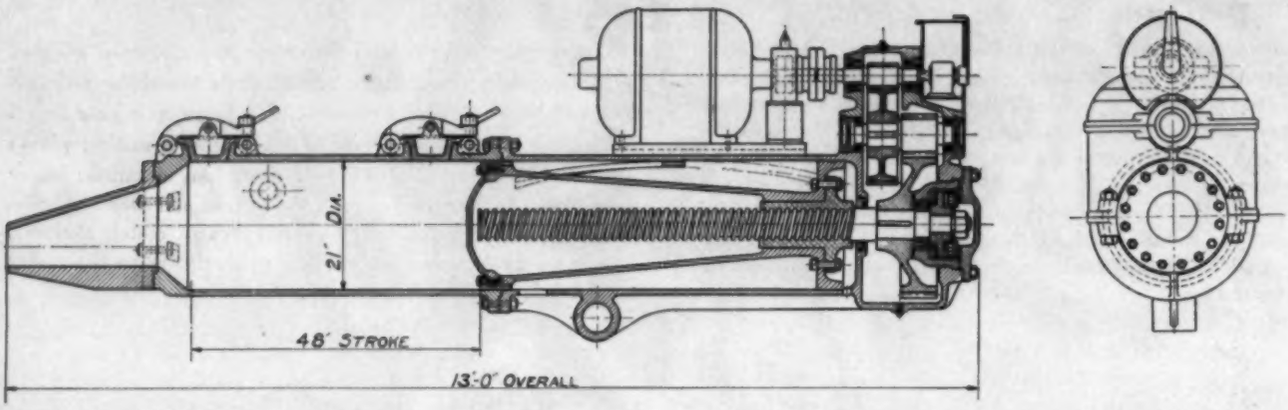


TOTAL WEIGHT — CLAY GUN
24,000 Pounds.

WILLIAM M. BAILEY COMPANY · *Engineers* · **Pittsburgh, Pa.**

(TURN PAGE)

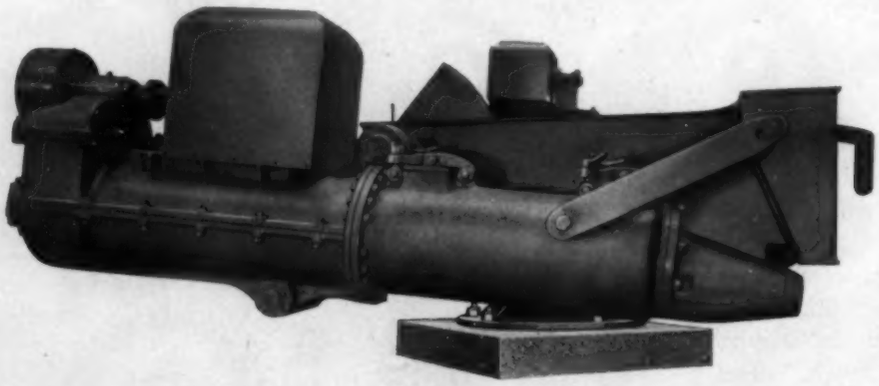
THE BAILEY ELECTRIC PLUNGER CLAY GUN



THE CLAY GUN:

The Gun itself, as shown above, is of the Plunger Type, in which the plunger is driven by a highly efficient power screw and double reduction gear drive, and embodies the principle of a rotating screw and traveling nut. The Plunger is a long hollow steel casting with a head at each end which maintains perfect alignment. The front of the plunger is the extruding head which is provided with a removable hardened steel wearing ring. The middle section of the plunger provides a complete enclosure for the screw and acts as a large oil reservoir, so that the screw always operates in oil assuring constant lubrication and at the same time thoroughly protects the screw from grit and dirt. The rear of the plunger is provided with a long bronze nut for the actuating screw and is arranged so that no clay can get back to the screw shaft. The plunger makes a quarter turn spirally as it makes its stroke in order to assure free action and to prevent wear from occurring at one point. The rear end of the screw is mounted in a self-aligning bearing backed by a heavy thrust bearing. An indicator of the dial type shows the position of the plunger in the clay barrel. A high torque 25 H. P. Motor drives the screw through heavy double reduction gears running in self-aligning roller bearings which are mounted in a compact unit at the rear of the Gun. The travel of the plunger is automatically stopped at each end of its stroke by limit switches.

The Gun has a clay barrel capacity of 9.6 cubic feet and its powerful plunger drive will develop a clay pressure of 600 pounds per square inch which assures the maintenance of long holes.



ELECTRICAL EQUIPMENT

The Gun is equipped with three motors, each motor having separate and individual control. The plunger motor is 25 H. P.; the clamping motor is 25 H. P.; the carriage rotating motor is 5 H. P.; alternating current motors 25 or 60 cycle are standard equipment. Direct current motors can also be used.

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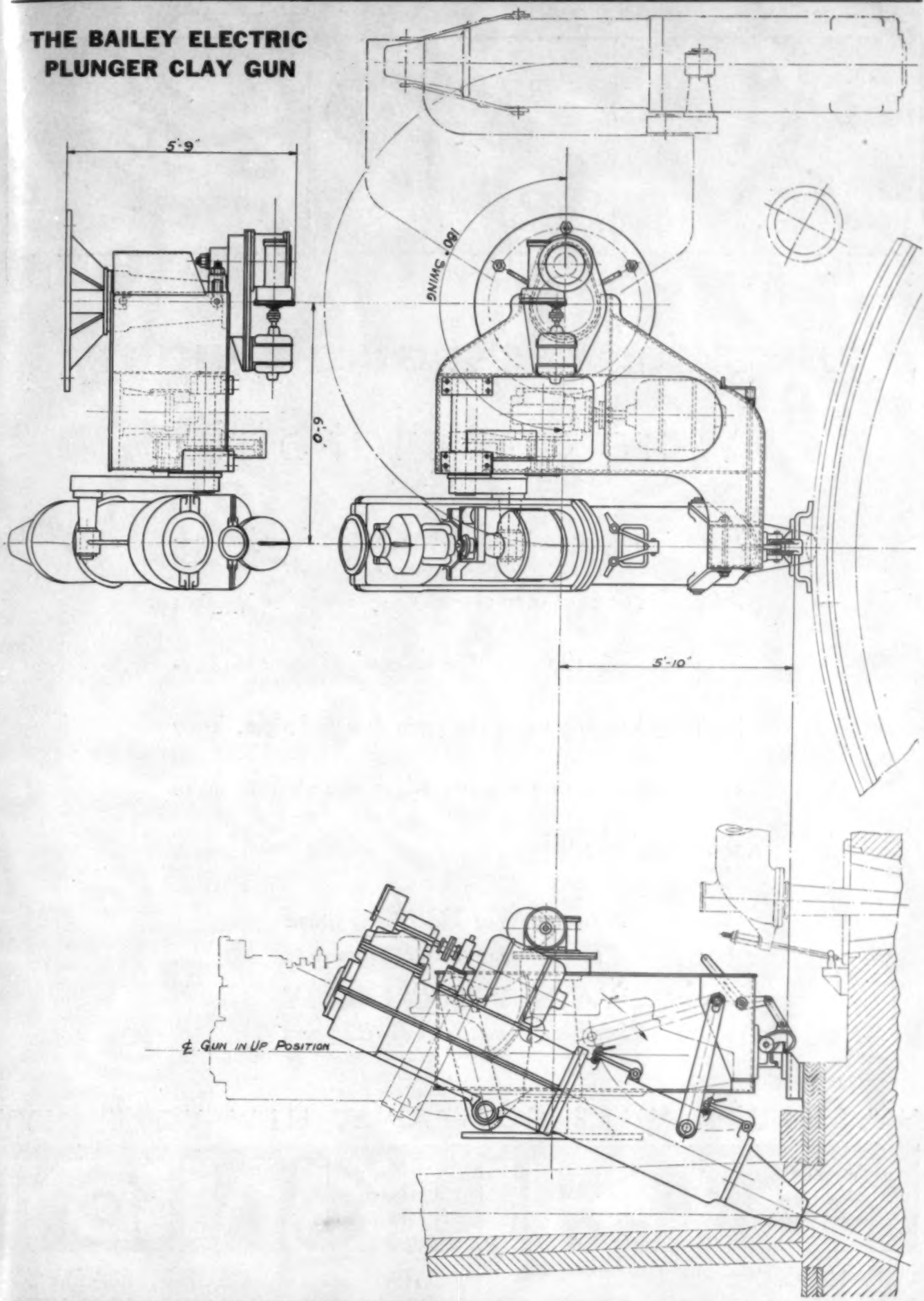
THE BAILEY ELECTRIC PLUNGER CLAY GUN



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Just plain "Washburn Quality" Wire and Flat Strip

There is no sense in our picturing Tanks—Jeeps—Airplanes and Guns to prove Washburn Wire is doing its part to win the war. The folks who *know* are proving it by keeping us on the jump day and night. They can depend on it for parts which are vital to make these machines tick.

After the War YOUR peacetime product may need it as much

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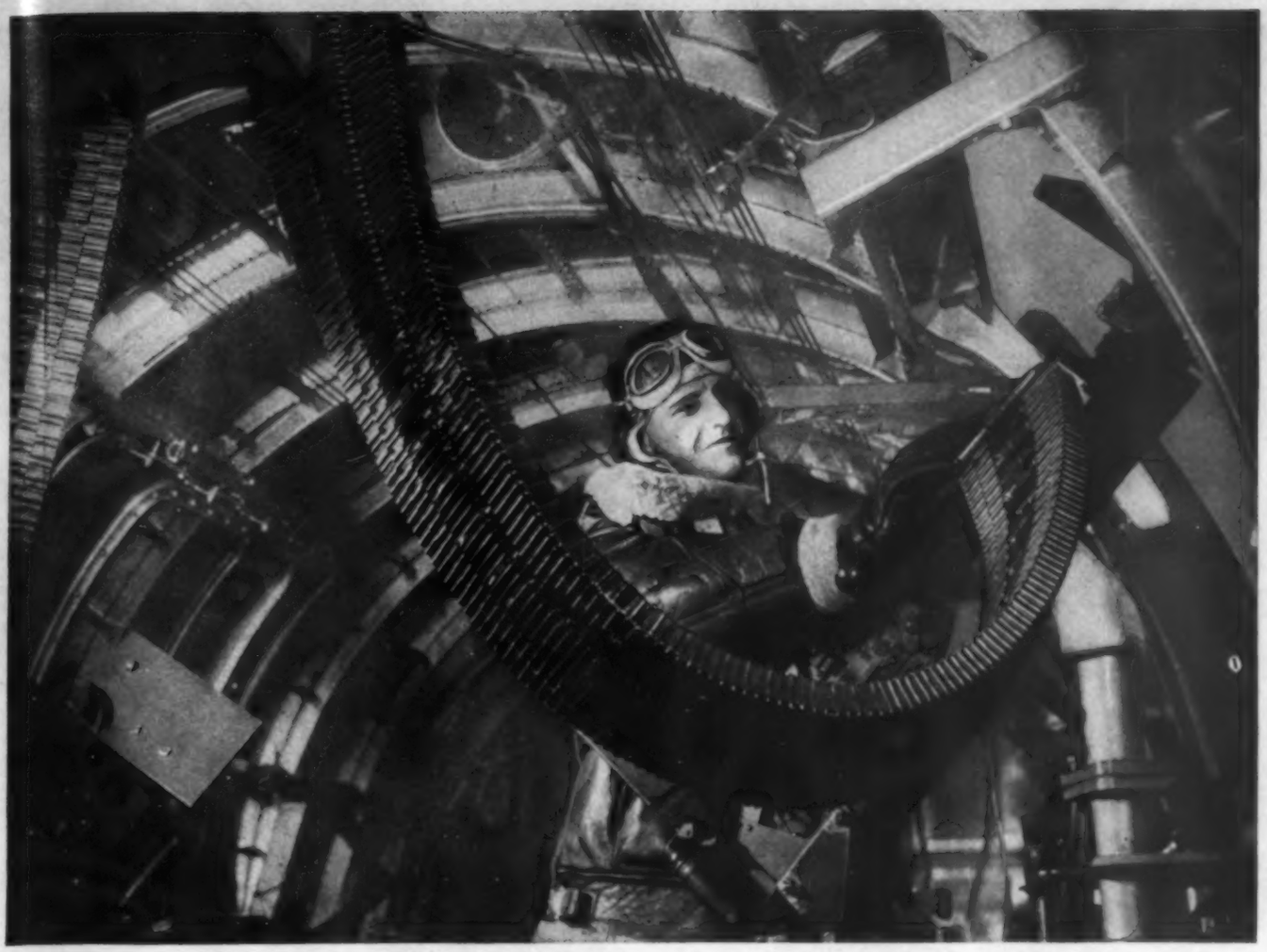
TEMPERED AND UNTEMPERED FLAT AND ROUND HIGH CARBON WIRES



600 ROUNDS-A-MINUTE...per Gun!

INSIDE this Flying Fortress, the side gunner inspects belts which feed up to 600 bullets a minute as the big ship gets set for a trip over enemy targets. For guns like these, the need is absolutely vital for unlimited amounts of ammunition.

In producing not only the ammunition, but guns, planes, ships, tanks, and other weapons, war plants everywhere are increasing output and lengthening cutting-tool life, by using *Texaco Cutting Oils*.

For example, on both *al*uminum and *mag*nesium, *Texaco ALMAG Cutting Oil* adequately cools and lubricates the cutting tools, prolongs their life, increases cutting speeds, steps up output. *ALMAG* is transparent, permitting the operator to *see* . . . and is non-irritating to the skin.

So effective have Texaco lubricants proved that they are definitely preferred in many other important fields, a few of which are listed in the panel.

A Texaco Engineer specializing in cutting coolants will gladly cooperate in the selection of the most suitable lubricants for your equipment. Just phone the nearest of more than 2300 Texaco distributing points in the 48 States, or write:

The Texas Company, 135 East 42nd Street, New York, N. Y.

THEY PREFER TEXACO

★More buses, more bus lines and more bus-miles are lubricated and fueled with Texaco than with any other brand.

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TEXACO

TEXACO CUTTING, SOLUBLE AND HYDRAULIC OILS FOR FASTER MACHINING

TUNE IN THE TEXACO STAR THEATRE EVERY SUNDAY NIGHT – CBS ★ HELP WIN THE WAR BY RETURNING EMPTY DRUMS PROMPTLY

ABRASIVE COMPANY

Victory Points

WITH DEMOUNTABLE SPINDLES

PATENT PENDING
★ ★ ★

Save Steel . . . for War Production

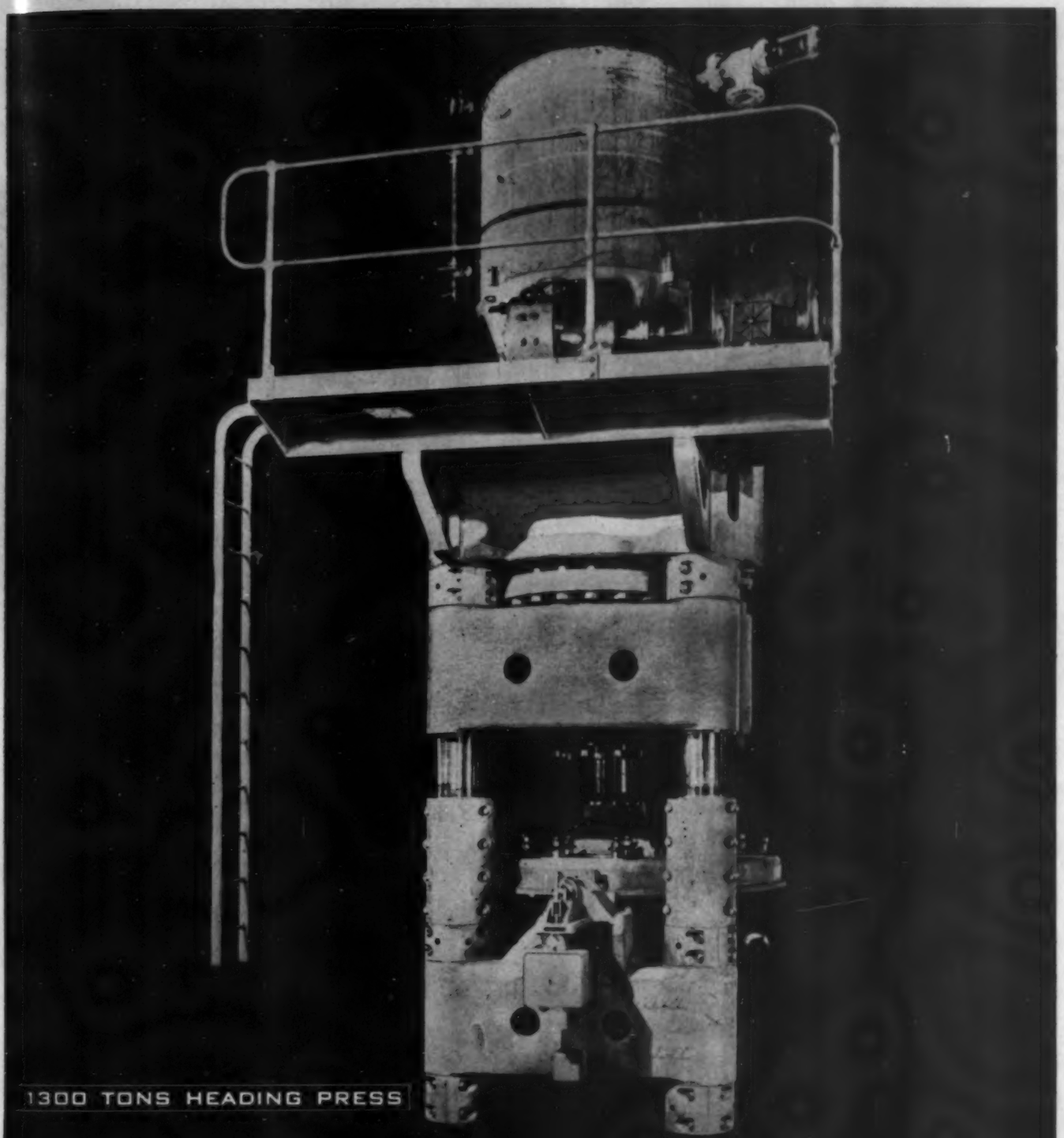
If you use Mounted Wheels and Mounted Points . . . switch to Abrasive Company new VICTORY POINTS . . . and save critical steel for war production! Their demountable, replaceable spindles permit quicker changing and greater convenience and more accurate work, since the spindle cannot pull loose, twist or turn.

For complete information about this outstanding new development write for our new bulletin on VICTORY POINTS, Form ESA-65.

ABRASIVE COMPANY

DIVISION OF SIMONDS SAW AND STEEL CO.

TACONY & FRALEY STS., PHILADELPHIA, PA. • DISTRIBUTORS IN ALL PRINCIPAL CITIES


1300 TONS HEADING PRESS

HYDROPRESS · INC.

ENGINEERS CONTRACTORS

HYDRAULIC PRESSES · ROLLING MILLS
PUMPS · ACCUMULATORS

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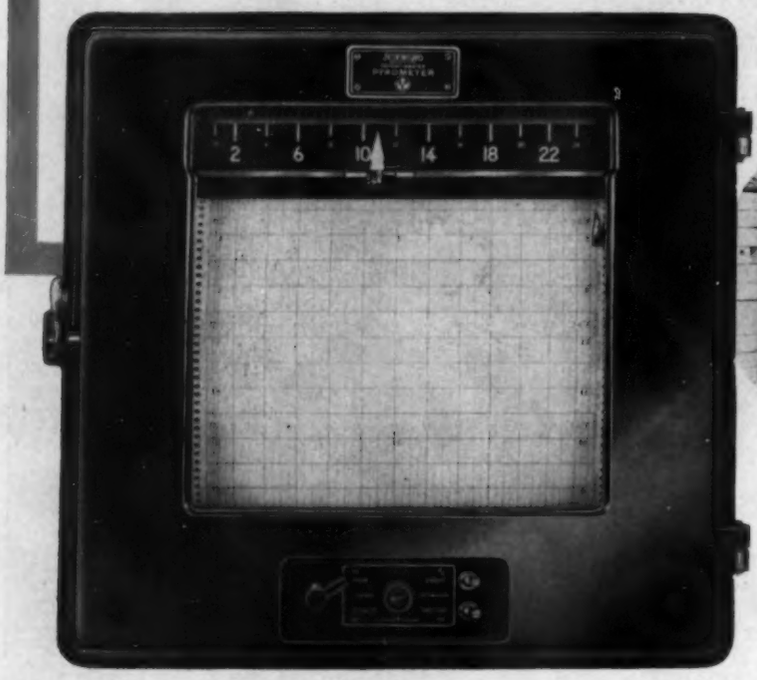
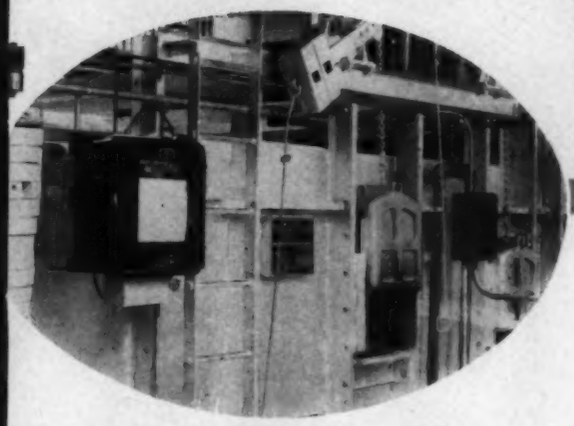
Here's *Everything* you want in a Recording Pyrometer!





In toughest service, like this forging furnace installation, Foxboro Potentiometer Recorders give guaranteed accuracy of ¼ of 1% of scale range.

ARMY (E) NAVY

"Hair-trigger" sensing, quick balancing, no dead spots or lost motion. It's the Foxboro Potentiometer Recorder!

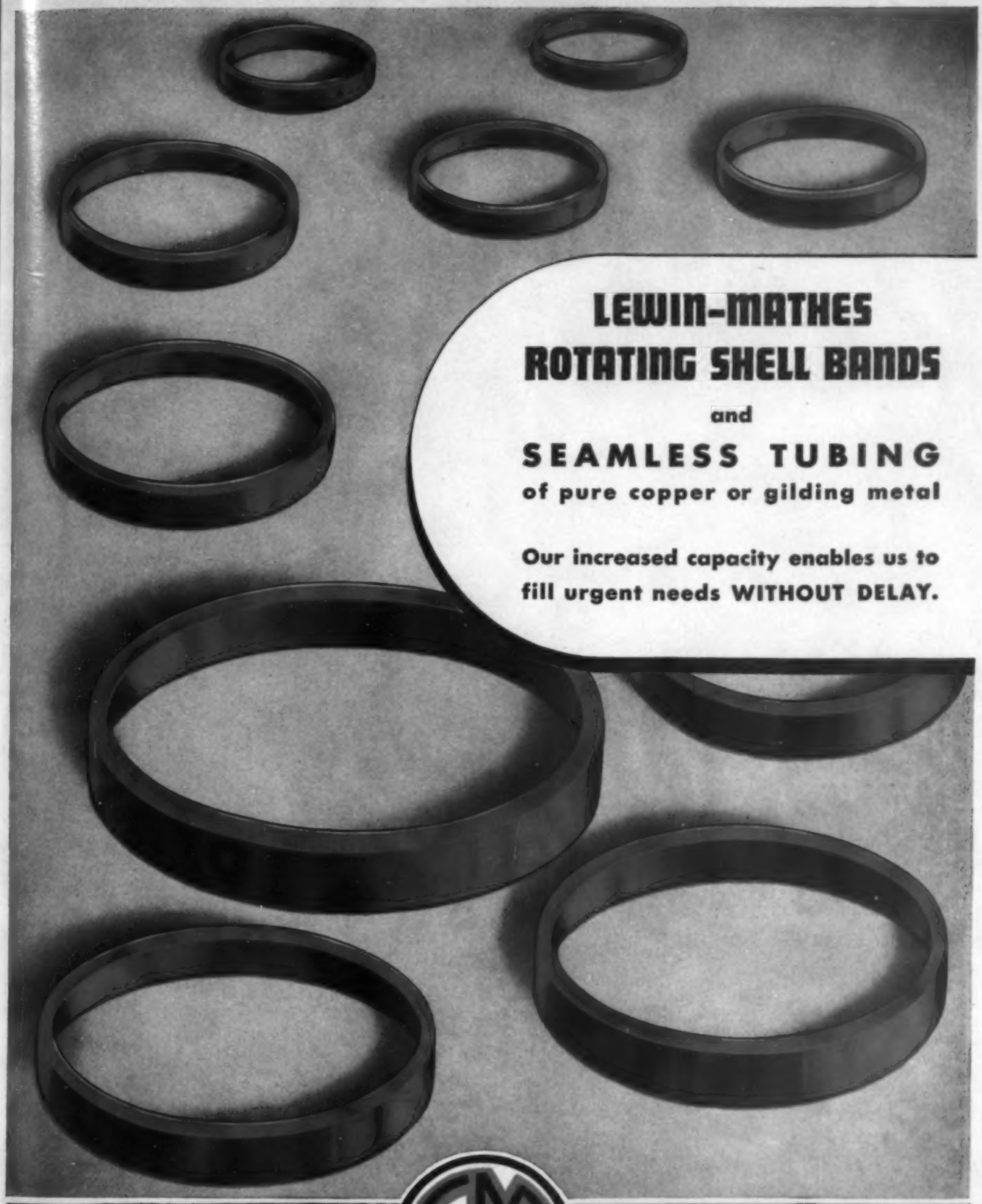
Wartime production is furnishing new proof that Foxboro Potentiometer Recorders deliver the goods, month after month, without shutdowns or deviations in accuracy. In many warplants, these better-engineered pyrometers now provide 24-hour temperature records so dependable that Army-Navy standards of heat-treating can be uniformly fulfilled.

Dependability like this is the sum of exclusive refinements in nearly every feature of design . . . hair-trigger sensing of galvanometer deflections . . . a balancing device that acts fast without fast-driving of mechanisms . . . integral mounting of slide-wire contacts and recording device . . . galvanometer suspensions that do not break . . . ball bearings at all important points.

Write for Bulletin 190-5 containing full details of this and other precision-engineered Foxboro Potentiometer Instruments. **The Foxboro Co., 118 Neponset Avenue, Foxboro, Mass., U. S. A.** Branches in principal cities of U. S. and Canada.

Potentiometer Instruments by FOXBORO

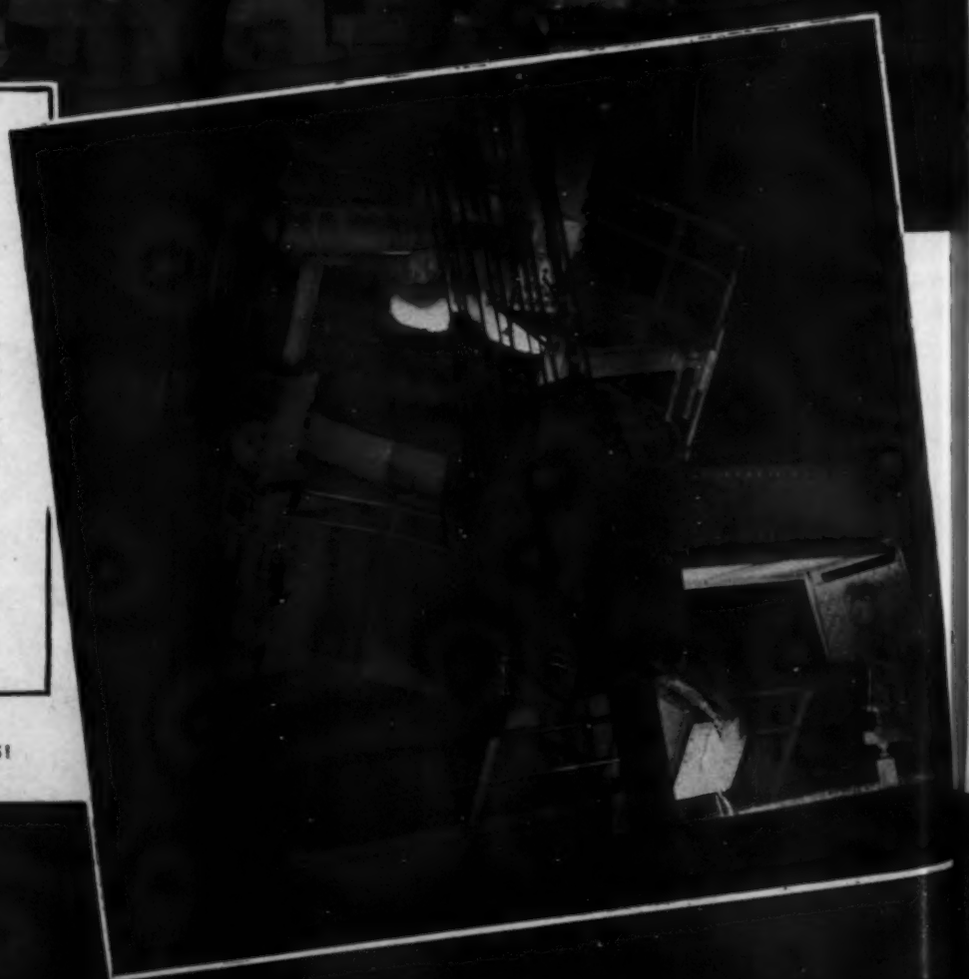
Reg. U. S. Pat. Off.


LEWIN-MATHES
ROTATING SHELL BANDS
and
SEAMLESS TUBING
of pure copper or gilding metal
Our increased capacity enables us to
fill urgent needs WITHOUT DELAY.
LEWIN MATHES
LEWIN-MATHES COMPANY • • SAINT LOUIS, MISSOURI

Announcing

High-Quality Electric Furnace Steel starts here

One of the new Heroult electric furnaces now making alloy steel at our Duquesne Works. All welded construction—equipped with 20-inch graphite electrode—the platform attached to the shell tilts with the furnace when pouring. Novel features that make for improved performance include ball and roller bearings on electrode arms and winches; water-cooled, current-carrying copper tubing arranged to prevent hysteresis and eddy current losses; improved wedge-type electrode holders.



ONE AIM . . . VICTORY . . . BUY BONDS!

New, greatly increased Electric Furnace capacity to serve the East with quality alloy steels

IMPORTANT to every user of alloy steel in the Eastern area is the recent expansion of our electric furnace capacity at Duquesne, near Pittsburgh.

Now in operation, this large and thoroughly modern plant brings to your very door-step, facilities for rolling, annealing and heat-treating a complete range of fine electric furnace steels in all commercial forms.

Equipment throughout, from raw materials handling to finish processing, embodies the most advanced ideas in electric steel production.

High-efficiency Heroult electric furnaces of the very latest type assure top metallurgical performance. With capacities ranging from 7 to 70 tons each, they provide a wide degree of flexibility to handle both large and small orders.

Soaking pits are provided with automatic combustion control to insure greater uniformity in heating the steel. A seven-chamber continuous annealing and heat-treating furnace, automatically controlled, insures superior physical properties in the heat-treated product. It is supplemented by batch type furnaces for handling larger bar sizes and special heat-treating requirements.

The auxiliary equipment is of the latest, most improved design and is adequate to meet the many and various needs of the alloy steel user.

Equipment facilities are matched in calibre by the skill of experienced mill and metallurgical personnel whose constant watchword is "Quality First."

Now ready to expedite the servicing of your wartime needs for electric steels, this new plant will, in the future, be ready to serve your peacetime requirements—both in small and large tonnages—with the same high quality for which U·S·S Carilloy Steels are noted.

CARNEGIE-ILLINOIS STEEL CORPORATION

Pittsburgh and Chicago

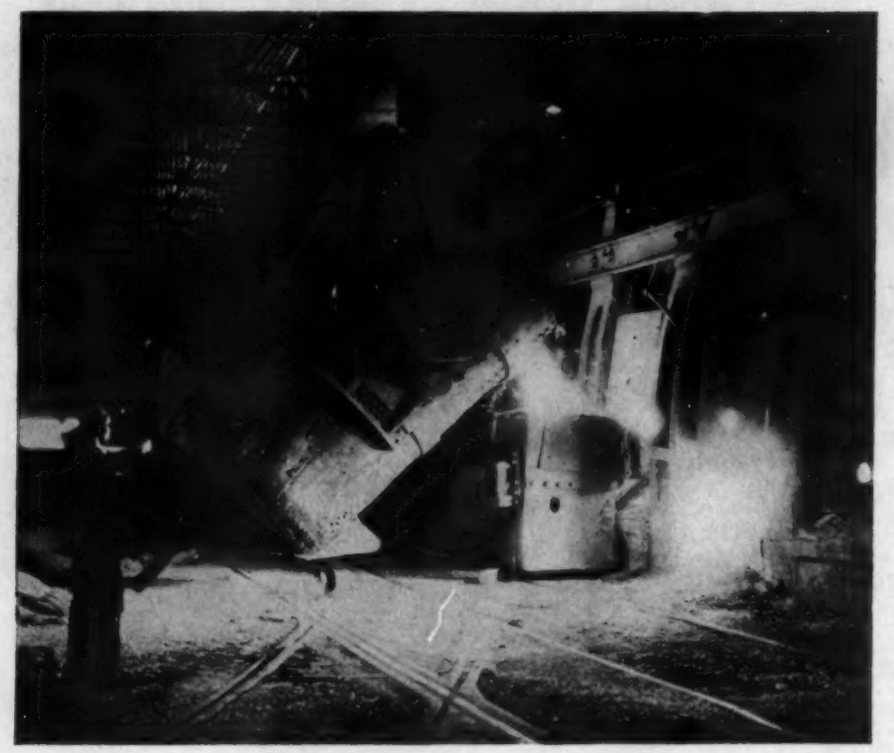
Columbia Steel Company, San Francisco, *Pacific Coast Distributors* · United States Steel Export Company, New York

USS

UNITED STATES STEEL

Weirton's "DOUBLE CONTROL" of quality

means *better steel* for the Armed Forces



Weirton's "double control" of quality starts at the very first step in the steel-making process—that is, with the iron ore. From that point on, the combination of control by men and machines maintains quality. Each step is under the critical eyes of skilled and experienced men—men who have devoted their lives to the art and science of better steel-making.

Coupled with these masters of their craft are the most modern—the most advanced—machines and equipment that have been developed by and for the steel industry.

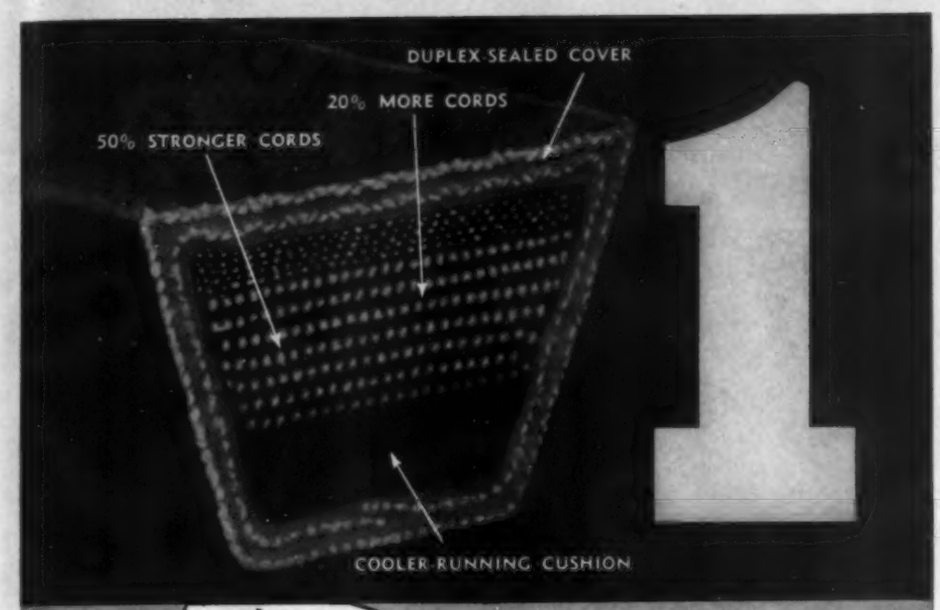
So, at every step, skilled men and the best machinery are combined to provide "double control" to all Weirton steel. Every man and woman at Weirton is working to see that our Armed Forces get the steel they need to speed Victory at the earliest possible moment.

WEIRTON STEEL COMPANY
Weirton, West Virginia

Sales Offices in Principal Cities

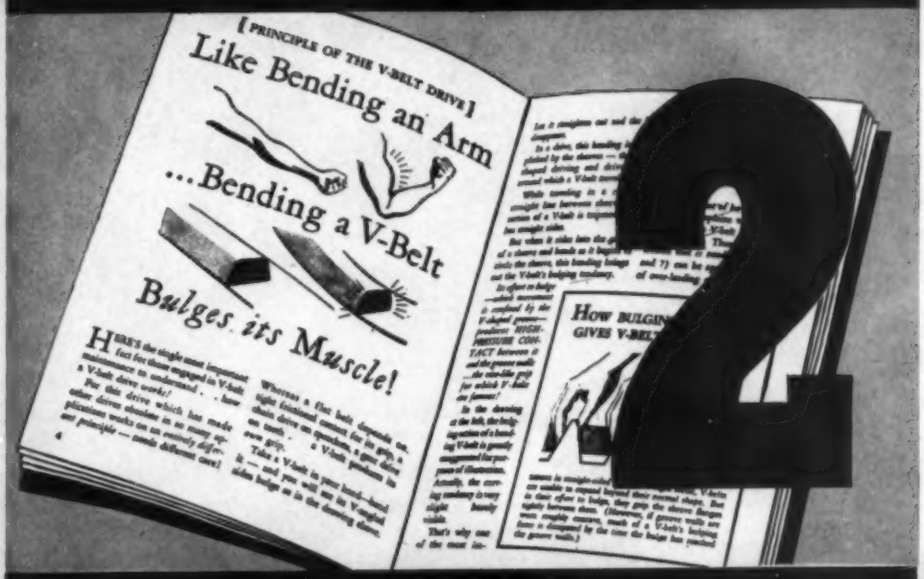
Division of
NATIONAL STEEL CORPORATION
Executive Offices · Pittsburgh, Pa.

PUT THE Brakes on V-Belt Wear (DO IT TWO WAYS)



1 BUY THE BEST BELTS. .

You'll find design-against-wear at its finest in Texrope Super-7 V-Belts! 20% more pulling cords — each *50% stronger*, thanks to the New Flexon Process — combat stretching, give Super-7's extra power and durability. Cords are eased around sheaves on a shock-absorbing cushion of special cool-running rubber that combats flexing heat, enemy of V-belts. Tough, new Duplex-Sealed cover protects inner belt structure. When you do need new belts, *invest in the best* — Texrope Super-7!



2 USE THE BEST CARE. .

Whatever brand of V-belts you are now using, you can make them last *longer* by following the tips in Allis-Chalmers' free handbook: Plain Facts on Wartime Care of Rubber V-Belts." Typical contents: how V-belt anatomy affects maintenance . . . good rule-of-thumb for tension . . . seven dead V-belts and what killed them. Packed with practical data, fully illustrated, the new handbook is specially suited for training new men. Tear off the coupon below and send for this valuable new handbook today!

ALLIS-CHALMERS

TEXROPE* SUPER-7 V-BELTS

WE WORK FOR VICTORY — WE PLAN FOR PEACE

*Trade mark registered U. S. Patent Office. Texrope Super-7 V-Belts are the result of the cooperative research and design genius of two great companies—Allis-Chalmers and B. F. Goodrich—and are sold exclusively by Allis-Chalmers. Available in all sizes

ALLIS-CHALMERS MFG. CO.
Milwaukee, Wisconsin

Gentlemen:

Yes, I would like to receive free of charge a copy of your "Plain Facts on Wartime Care of V-Belts".

_____ (Name)

_____ (Title)

_____ (Company)

_____ (Street Address)

_____ (City and State) A-1605-S

The Operator may be different but the Quality of Tool Grinding is the Same

THE essential features of the Sellers Heavy Duty Tool Grinding Machine—simplicity, accuracy, uniformity—are of greater value today than ever before. They permit the operation of these versatile, high production precision tool grinders by newly trained and relatively inexperienced personnel. Even women operators on these machines can grind any cemented carbide or high speed steel, straight or convex curved face tools, including thread tools of any angle of thread or pitch, internal or external, and can accurately reproduce the desired angles or clearances on all the tools. They keep production moving.

WILLIAM SELLERS & CO., INC., PHILADELPHIA, PA.

FOUNDED SELLERS 1848

Sellers

This advertisement is one of a series appearing regularly in national periodicals, farm publications and many city newspapers. Reprints in full color are available for your use. Write us for them.

"Vote for That Guy? Not on Your Life!"

"This war's made me think how important it is to use your head when you vote. Once, they could vote in Germany—but they got careless. Now they just say 'Ja'—or else. Knowing who you're voting for is the best way to keep little would-be Hitlers from getting in the driver's seat over here!"

★ ★ ★

Our right to vote secretly and without fear of reprisal is one of our most precious rights as *FREE* Americans. It gives us the power to protect *at home* the very freedoms for which we are waging war.

FREE American business, *FREE* labor and *FREE* agriculture—working together the American way, have built within two years a far greater war machine than Hitler's dictatorship and a "super-race" built in ten years.

American production records have been broken. Output has jumped to all-time highs. And quality has increased.

We at Republic are turning out more and better steel than ever before. Because Republic steel makers have the ability and increased capacity—plus the initiative and will to do more that flourish in the hearts of *FREE* men who want to stay *FREE*.

The same freedoms that are winning the war can build the kind of peacetime world that all of us hope for—a happy, comfortable, safe world where men can live, work, speak and worship as they please, secure from want and fear.

And plans are being made for steels that will help build a greater future in post-war days to come. To vast experience already acquired is being added new knowledge gained from the performance of steels in fighting action and in new methods of mass production—plus new developments from Republic's increasing research—to bring you finer steels than ever before.

Is freedom worth fighting for? Millions of the finest of America's youth are betting their lives that it is. Let's do our part to help them by betting our skill, our time, our dollars on freedom, too.

REPUBLIC STEEL CORPORATION

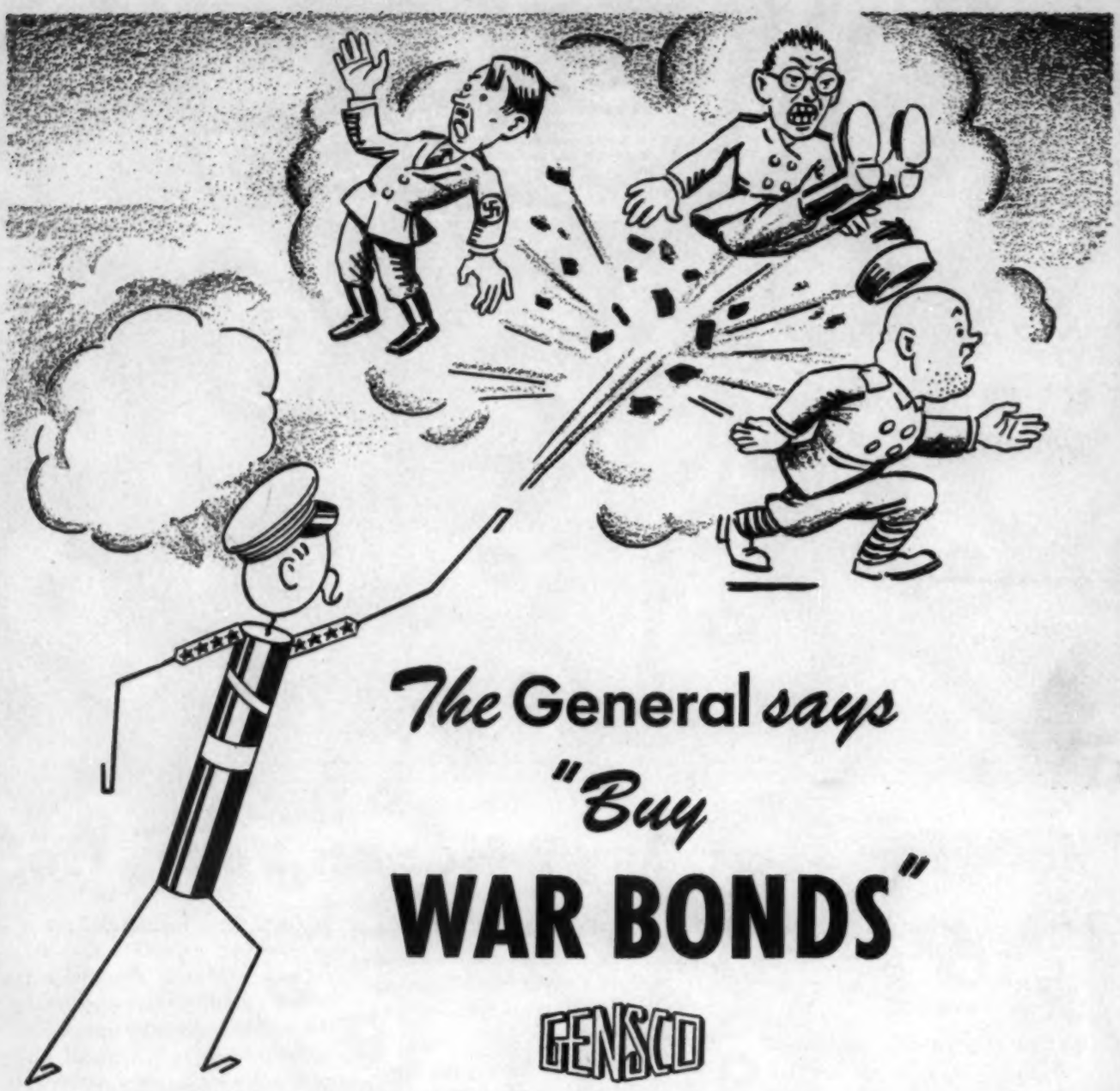
General Offices: Cleveland, Ohio

Berger Manufacturing Division • Culvert Division
Niles Steel Products Division • Steel and Tubes Division
Union Drawn Steel Division • Truscon Steel Company
Export Department: Chrysler Bldg., New York, N. Y.

Republic

CARBON, ALLOY AND ENDURO STAINLESS STEELS

Sheets—Plates—Pipe—Hot Rolled and Cold Drawn Bars
— Upson Bolts, Nuts and Rivets — Electrunite Tubing



The General *says*

"Buy

WAR BONDS"

GENSCO

COLD FINISHED BARS
COLD ROLLED STRIP STEEL
COLD ROLLED SHIM STEEL
SHEET STEEL . . . and TEMPERED
and ANNEALED SPRING STEEL
AIRCRAFT STRIP STEEL

ROUND EDGE FLAT WIRE
ROUND WIRES
DRILL ROD
STEEL BALLS
FEELER GAUGE

GENERAL STEEL WAREHOUSE CO. INC.

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441 Lexington Avenue
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1280 Amherst Place
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Immediate WAREHOUSE SHIPMENTS

HANSEN

HOSE CLAMP SOCKETS

save Air save Time

Hansen hose clamp sockets "double" in time and air savings. On the socket end it's merely a matter of slight push of plug into socket . . . in a flash it's connected and air is automatically turned on. A gentle pull on sleeve, plug is ejected, line is disconnected and air is automatically turned off. Absolutely leakproof at pressures over 12,000 pounds. There you have *time savings and air savings.*

Hansen hose clamp has a 2 to 1 advantage over other compression type hose clamps because they grip on the inside as well as the outside of hose. They will handle a working pressure of over 500 pounds. Anyone can install them in a few minutes, requires no special tools and can be used many times over. There again, is *time savings,* air savings and real economy with Hansen equipment.

Send for free catalog

THE HANSEN MFG. CO.
CLEVELAND, OHIO

HANSEN
INDUSTRIAL AIRLINE
Equipment

AIR HOSE COUPLINGS • HOSE CLAMP SOCKETS • HOSE CLAMPS
AIR BLOW GUNS • HOSE CLAMP PLUGS • ENGINE CLEANERS
SANDBLAST CLEANERS • AIR-LIQUID SPRAY GUNS

A wrench will get it on or off in *Sixty Seconds*

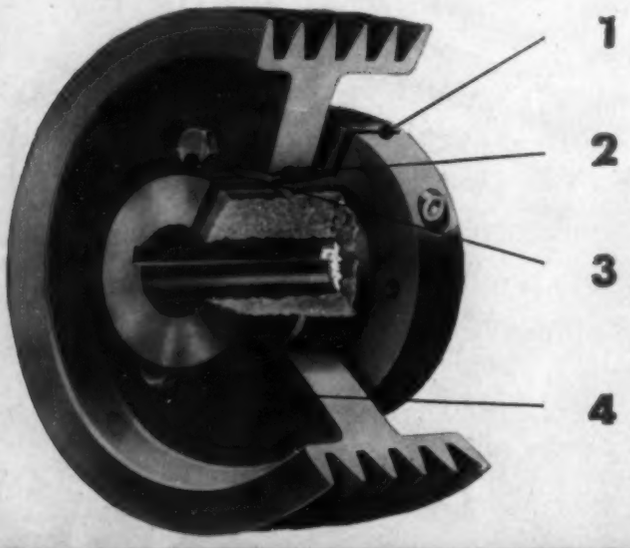
GONE FOREVER is the dangerous, time-wasting method of sledging a V-belt sheave off a shaft.

IF IT'S A WORTHINGTON *QD SHEAVE

Twirl off the pull-up bolts with a socket wrench . . . Insert two of the bolts into the two tapped holes in the rim forcing the rim off the tapered hub.

The Worthington QD Sheave is "easy to get on, easy to get off . . . yet always tight on the shaft," a development that will help you conserve vital equipment, energy and time.

Investigate the advantages of the QD Sheave today. Arrange with the Worthington authorized Multi-V-Drive dealer in your area for a demonstration of the patented QD Sheave principle.



SPLIT HUB for easy mounting or removal from the shaft.

TAPERED FIT between split hub and rim for easy mounting or removal of rim from hub.

PULL-UP BOLTS which pull the rim onto tapered split hub for tapered friction drive assembly and positive press fit on the shaft.

TAPPED HOLES IN RIM for using pull-up bolts as jack screws to free the tapered friction fit when detaching the rim.

*QD
QUICK DETACHABLE SHEAVE
MEMBER
MULTIPLE V-BELT DRIVE ASS'N

MV3-7

COMPLETE DRIVES

WORTHINGTON MULTI-V-DRIVES

SHEAVES OR BELTS ONLY

WORTHINGTON PUMP & MACHINERY CORPORATION • GENERAL OFFICES: HARRISON, N. J.

26 LETTERS...500,000 WORDS

Consider our alphabet—26 rather odd-looking symbols—or the marvelous "building-blocks" from which the rich half-million word vocabulary of our language has been built. It all depends on how you look at it.

Toledo Scale Research, too, started with "building-blocks" fully as prosaic as the alphabet itself. Man has known the basic principles of weighing for thousands of years. But it was the application of the Research Method that has made possible the truly amazing advances in weight-control and force-measuring. Located as they usually are, deep in the vital centers of industry, these Toledo devices are seldom seen by the general public. Yet, they control the quality and quantity of almost every kind of product... not only the familiar peace-time items... but the planes, tanks, engines, and munitions so vital to Victory!

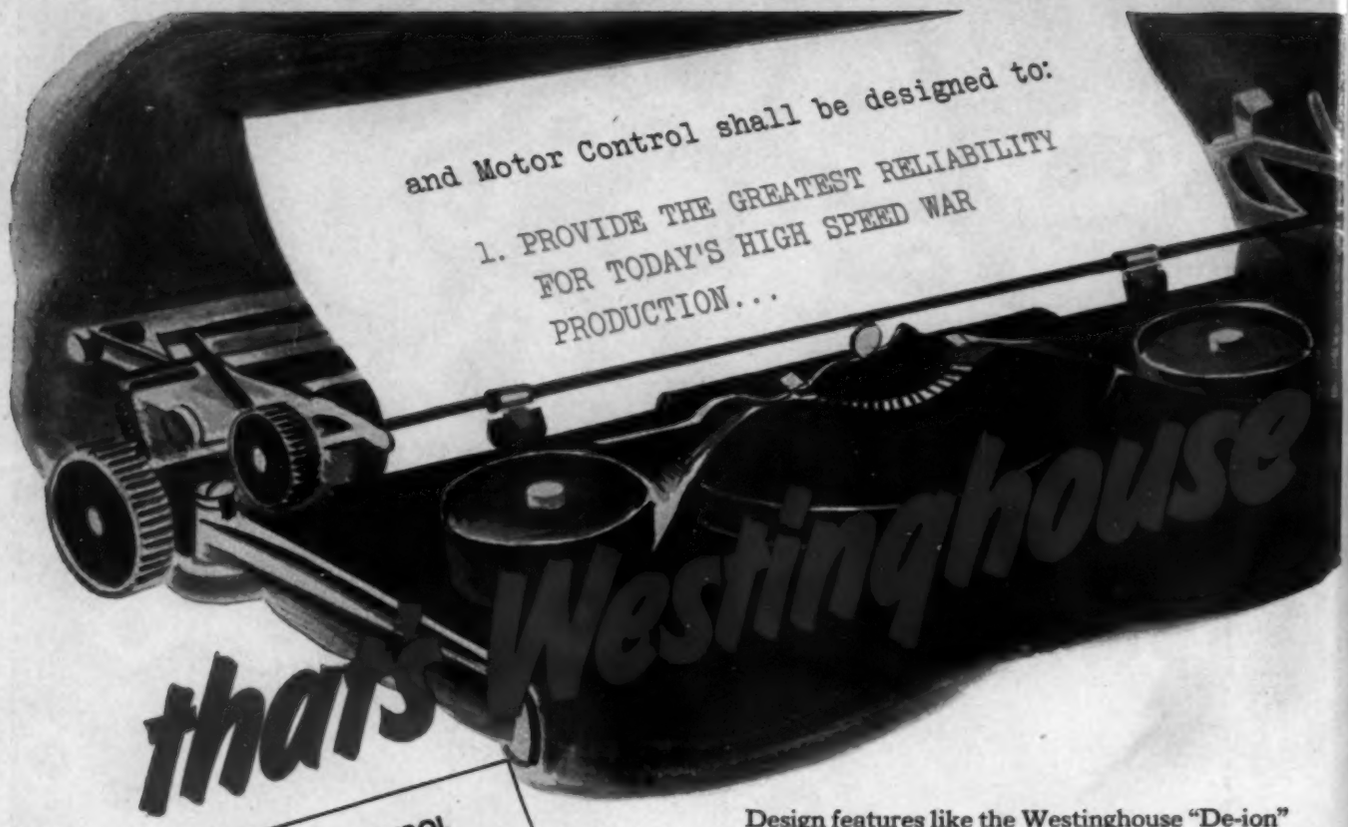
Today, the results of Toledo Research appear in new and faster ways to weigh and classify bullets, measure airplane stresses under flight conditions, balance and standardize propellers, test engine horsepower, automatically control chemical batching... count, balance, record weight-facts... and in dozens of other essential control operations unthought of even a few years ago. These developments...and the ones still in the laboratory... are important to you, and to industry everywhere. For they mean that you can confidently look to Toledo for the greatest fund of practical "know-how" for the solution of your weight-control problems today...and in the days after Victory is won.

RESEARCH: *This man, at the control-panel, is weighing 9 different ingredients going into 3 furnaces of an alloy steel plant ... an operation made rapid, accurate and completely automatic by Toledo Scale Electric Weight-Control ... another product of Toledo Research.*

TOLEDO SCALE COMPANY

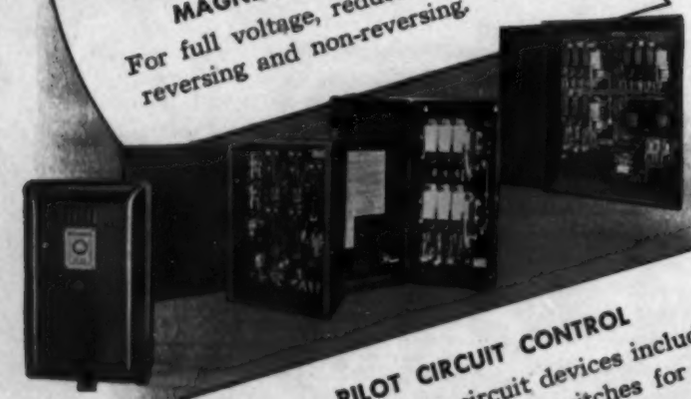
Toledo, Ohio

Canadian Toledo Scale Co., Limited, Toronto, Ont.

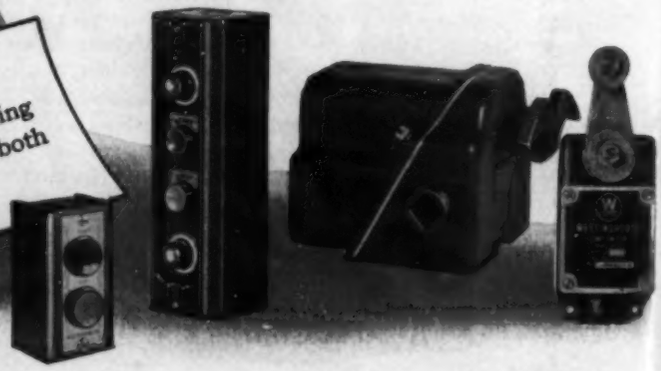

and Motor Control shall be designed to:
1. PROVIDE THE GREATEST RELIABILITY FOR TODAY'S HIGH SPEED WAR PRODUCTION...
that's Westinghouse

MANUAL MOTOR CONTROL
For full voltage, reduced voltage, or step starting, speed regulating, reversing and non-reversing.

MAGNETIC MOTOR STARTERS
For full voltage, reduced voltage, step, reversing and non-reversing.



PILOT CIRCUIT CONTROL
All types of Pilot circuit devices including push buttons and limit switches for both standard and heavy-duty service.



Design features like the Westinghouse "De-ion" principle of arc extinction are certainly a common-sense "must". And today's production goals need the kind of protection that the Bi-metal overload relay can give. The Westinghouse line of a-c and d-c motor controls is complete for motor types that meet requirements of a wide variety of applications.

So when you need motor controls—write "Westinghouse" in the specifications. Then get your Westinghouse representative on the phone. He'll help you all the way from application to installation. Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa., Dept. 7-N.

J-21270

Westinghouse

PLANTS IN 25 CITIES... OFFICES EVERYWHERE

MOTORS AND CONTROLS

"Needles in Haystacks" ARE EASY TO FIND

WHEN you put electrons to work, many "impossible" tasks become extremely simple.

So it is in Dynetric Balancing where the stroboglow lamp and electron tubes work together to *locate* and *measure* unbalanced forces in high speed rotating parts. Dynetric Balancing Machines now do in a few seconds what used to take minutes and hours. And they do it with a degree of fineness that is not possible by any other method.

Their greater speed and accuracy mean lower cost in assuring smoother performance and longer life in all kinds of modern precision machinery.

GISHOLT MACHINE COMPANY
1217 East Washington Avenue • Madison, Wisconsin

URRET LATHES · AUTOMATIC LATHES · BALANCING MACHINES

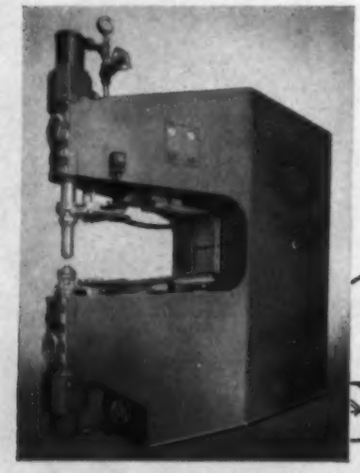
GISHOLT

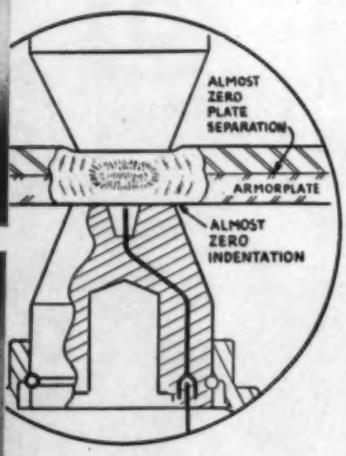
LOOK AHEAD . . . KEEP AHEAD . . .
WITH GISHOLT IMPROVEMENTS

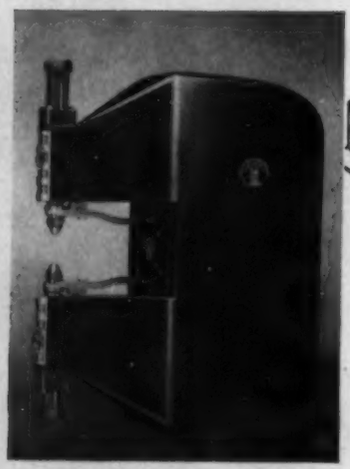
DYNETRIC BALANCING MACHINES are extremely simple to operate. Their range of application has now been extended to cover the balancing of any part from 1 ounce to 50 tons. Literature on request.

Welded Armorplate for Aircraft?

DEEP-THROAT TYPE, 600KVA







STANDARD 200KVA MODEL

FOR spot-welding of armor-plate assemblies for aircraft, Progressive recommends the TEMP-A-TROL* spot welder–the welder that "thinks for itself".

Today, already, TEMP-A-TROLS are welding armor-plate in production–and heat-treating the welds in the same operation.

Their phenomenal performance is due in large part to the thermocouple electrode which supplants the usual selective time-current controls with automatic temperature-controlled operation.

*Registered Trade Mark

Ask for Bulletin #301

PROGRESSIVE WELDER CO.

SEAM PRODUCTION & BUTT . . . *Electric Welding Equipment* . . . PORTABLE GUN & PEDESTAL

3050 E. OUTER DRIVE • DETROIT, U.S.A.

Here's a Grinding Wheel that Can Increase Production on *Many* Jobs

. . . The NORTON OPEN STRUCTURE Grinding Wheel

THE outstanding feature of Norton Open Structure Grinding Wheels and Segments is of course the large pore spaces that result in a very fast, cool cutting action. This means that No. 12 (open) structure products are especially suitable for jobs that require extra heavy stock removal, or extra coolness of cut, or both—such as:

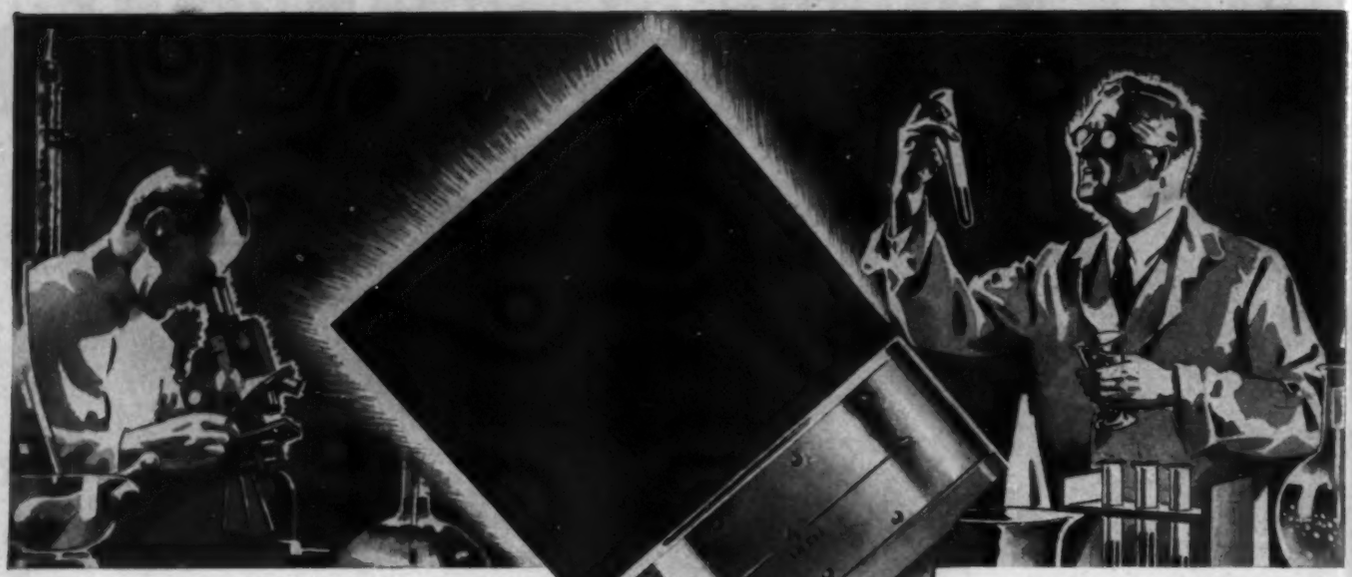
SURFACE GRINDING
HOB GRINDING
FORMED TOOL GRINDING
GEAR GRINDING
INTERNAL GRINDING

This Norton open structure wheel is a real production booster on many jobs. But it is just one of several Norton structures available. Let Norton engineers study your grinding jobs and make sure that you are using the most suitable wheels in abrasive and bond, in grain and grade as well as in structure.

NORTON COMPANY
WORCESTER, MASS.
Distributors in All Principal Cities

W-912

NORTON ABRASIVES



After Years of Laboratory Work and Extensive Testing "Pittsburgh" Now Offers

NEOCETA*

SYNTHETIC BRISTLE BRUSHES

Comparable in Quality and Performance to Brushes Made with Pure Natural Bristle

"Pittsburgh" scientists started their experiments two years before Pearl Harbor. They had instructions to continue their research work until they had developed synthetic bristle brushes which would be as efficient in performance as those made with the best natural bristles.

After three years, they have succeeded in meeting the specifications. As a result, "Pittsburgh" now offers America's first full line of synthetic bristle brushes. Repeated tests prove that these Neoceta brushes compare favorably with any pre-war brush you have ever used.

Everything You Ask for in A Paint Brush!

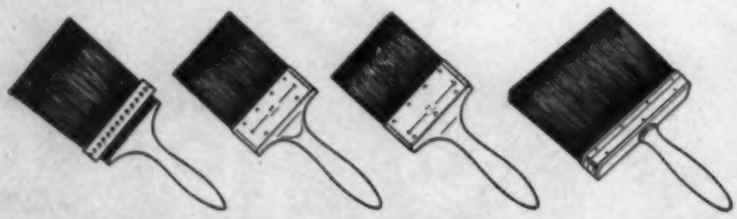
Neoceta brushes are highly practical and workable. Examine this bristle under a microscope and you will find that its taper is very similar to a natural bristle's. This allows paint to flow evenly and brush on smoothly. Neoceta brushes hold as much—*or more*—paint as pure bristle brushes and rival them in durability, spreading ability and the character of the film they produce. Here, in short, is a product that stands squarely on its own merits.

Availability

Winning the war comes first! Brushes of Neoceta are now available to the Army, Navy, or contractors for war materials for the Armed Services.

Bristle brushes, made and distributed in accordance with W. P. B. regulations, are also still available, with the necessary priority, through "Pittsburgh" branches everywhere.

**Trade Mark Reg. U. S. Patent Office No. 397,100*



PITTSBURGH PLATE GLASS COMPANY

NEOCETA brushes are manufactured by the creators of famous *Gold Stripe* brushes

They Help a Mathematical Wizard Perform

THIS is a carload of castings—produced for a new instrument that directs anti-aircraft fire with deadly accuracy. When enemy planes are approaching, this device determines their distance and speed—then in 5 seconds, performs calculations that would take many mathematicians several hours to perform.

The result of these calculations tells the gunner the exact moment to fire, and gives the precise spot at which the fire must be aimed.

Every part that goes into this anti-aircraft director must be absolutely true to size, and capable of delivering uninterrupted performance. Bronze castings, produced centrifugally by Shenango-Penn, answered these requirements—as they have for many other vital uses where wheels turn or where wearing or corrosion exists.

Engineers who are looking for additional facilities to produce bushings, bearings, pump and cylinder liners, sleeves, etc., will find that Shenango-Penn centrifugal casting facilities offer a wide range of sizes and a selection of ferrous and non-ferrous alloys that will meet all army, navy, air corps and engineers requirements. For more complete information, write for Bulletin No. 143 today.

SHENANGO-PENN MOLD COMPANY
413 West Third Street, Dover, Ohio
Executive Offices: Pittsburgh, Pa.

ALL BRONZES • MONEL METAL • ALLOY IRONS

IN 194 . . ? M-H/Brown Electronic Recording and Control Instruments will usher in a new era in peacetime production.

In the manufacture of chemicals, petroleum products, steels, textiles, rubber, ceramics, paper, foods—and other products, M-H/Brown Electronic Instruments will provide a new conception of greater precision in measuring and controlling industrial processes.

We are proud of the M-H/Brown background of over 100 years experience in instrument engineering which *pioneered electronic instrumentation*. Today these instruments are producing the tools of war. When peace comes they will be available to industry. *M-H/Brown Electrons are coming.*

The Brown Instrument Company, 4462 Wayne Avenue, Philadelphia, Pennsylvania, a division of Minneapolis-Honeywell Regulator Company, Minneapolis, Minnesota. Offices in all principal cities. 119 Peter Street, Toronto, Canada—Wadsworth Road, Perivale, Middlesex, England—Nybrokajen 7, Stockholm, Sweden.

Instruments by **BROWN** *and Controls by*

MINNEAPOLIS-HONEYWELL

Advertisement JULY, 1943

COPPER ALLOY BULLETIN

REPORTING NEWS AND TECHNICAL DEVELOPMENTS OF COPPER AND COPPER-BASE ALLOYS

Prepared Each Month by the Bridgeport Brass Co. "Bridgeport" *Headquarters for BRASS, BRONZE and COPPER*

Correct Cleaning Procedure Important in Metal Fabrication

To obtain maximum results, the cleaning method used for metals should be chosen after careful consideration of the material to be removed, the equipment available, and the degree of cleanliness desired.

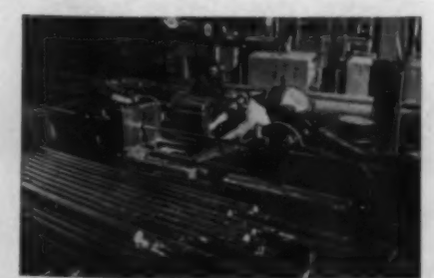
Lubricants made from animal or vegetable oils or grease can be removed by a saponification process, while unsaponifiable mineral oils can be removed by emulsification processes. Dirt particles can be removed by one of the processes mentioned. Scale from annealing, on the other hand, requires acid treatment.

The following points may prove helpful in the selection of cleaners: the cleaner should be free rinsing; oils and other materials should be removed without darkening the metal; volatile solvents do not cause tarnishing as may result with alkali cleaners, but are more expensive and may not leave grease-free surfaces unless carefully used; time in alkaline solutions should be as short as possible; work should be rinsed, preferably twice, after immersion or other chemical treatment.

Brass and copper do not require, and should not be subjected to, the strong alkalis used for iron and steel. Solutions that are too strongly alkaline may result in darkening, thus requiring further treatment to restore color and luster.

Memos on Brass—No. 40

Copper-zinc alloys containing more than 80% copper become suitable for spot welding operations with the addition of silicon as this element lowers the thermal and electrical conductivity of such alloys.



Experience and craftsmanship teamed with modern precision equipment enable Bridgeport to turn out an endless stream of brass for shells to smash the Axis. When the war ends, Bridgeport's vast resources will be ready to turn to producing the copper alloys that will be needed in a greater and better peacetime world.

Physical Properties of Brass Excellent for Cupping, Drawing

Copper-Zinc Alloy Takes Deeper Draw Per Operation Than Most Other Metals, Minimizes Punch and Die Wear

Wrought brass and practically all other copper-base alloys are considered among the most ductile of the commonly used metals and alloys. This property contributes to excellent workability, which together with the high corrosion resistance and general all-around good physical properties of these alloys, explains their wide use in the mass production of metal products for peace and war.

Such good workability is especially important in the cupping and drawing of sheet brass. Because of a low coefficient of friction between brass and steel, properly lubricated work does not wear the punches and dies as much as when steel instead of brass is drawn. Furthermore, brass can take a deeper draw per operation than most other metals.

Ductility, Strength Balance

However, in spite of its fine workability, difficulties are encountered occasionally by fabricators of brass and copper base alloy products. Most of the trouble is encountered in the cupping operation when the discs of sheet metal are formed into cups.

When cup breakage occurs, fabricators are inclined to report that the metal is too hard, too soft, or has hard spots. These statements are not always true. A piece of sheet metal is too hard when it has low ductility. On the other hand, it is too soft when it has too much ductility, thereby causing it to stretch too quickly and to break. It is necessary, therefore, as far as the temper of annealed material is concerned, to get the right balance of tensile strength and ductility in order to get the maximum draw.

Thin gauge material, such as .010, will give more trouble than heavy gauge material like .040, or some of the heavier cartridge case materials, because the cross-sectional area of thinner metal is much less and naturally weaker. Consequently, the pressure exerted against the surface of this metal during a normal drawing operation by the punch causes a high state of stress on the surface of the sheet metal at the point of contact. To compensate for this, thin gauge metal annealed at a lower temperature than that used for heavier gauged metal is furnished. The smaller grain size results in higher strength with very slightly lower ductility.

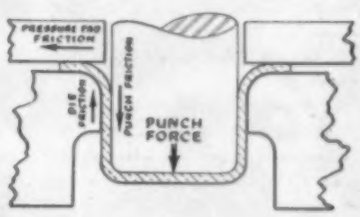
In most cases where the fabricator reports that the material is too hard, the metal has been found to be really too soft. This can be readily explained by the fact that copper and copper alloys, even those that have been lightly annealed and possess a fine grain structure and a slightly higher tensile strength, show considerable ductility.

Cups occasionally fracture on the radius at the bottom during cupping, during drawing, or at the finish of the drawing operation. Sometimes many good cups are obtained and the operator is inclined to indicate that the sheet metal has hard spots. What actually is happening is that the metal is so near the breaking point for that particular draw cup, that some cups go through well and others do not.

Lubrication Important

The present practices in the brass mills have been developed to a point so that uniformity of temper in any given lot is very satisfactory. It is reasonable to suppose that the less friction that is developed in any given drawing operation, the less

(*Continued on Page 2, Column 2*)



Die friction and pressure pad friction must be overcome by punch force and punch friction, as shown in the drawing above, in order to make a cup from a disc of sheet metal. As the pressure pad gradually releases the metal, it is ironed out over the die surface and wrinkling is prevented.

The punch force is transmitted largely by pushing against the bottom of the cup. Roughing the corners of the punch keeps the bottom of the cup from thinning. If die friction and pressure pad friction are so great that the resulting tensile load on the side wall exceeds the tensile strength of the metal, a break will occur. The cure is to reduce the die and pressure pad frictions to a minimum.

COPPER ALLOY BULLETIN

CAUSES OF CORROSION

INFLUENCE OF WATER COMPOSITION

It has been known for a long time that certain waters when heated will deposit a thick mineral scale on the metal surfaces with which the water comes into contact. The chemical composition of these mineral scales varies considerably. The most common scale, often found in water heating coils, consists essentially of calcium carbonate which is formed by the breakup of calcium bicarbonate, $Ca(HCO_3)_2$, at elevated temperatures according to the reaction: $Ca(HCO_3)_2 \overset{\text{heat}}{\rightleftarrows} Ca\,CO_3 + H_2O + CO_2$.

Since the calcium carbonate ($CaCO_3$) which forms is much less soluble than the original calcium bicarbonate, it slowly precipitates and over a period of time builds up a mineral deposit on the metal surfaces. Frequently when this reaction occurs considerable stifling of corrosion takes place. Specimens of brass have been examined which were so well protected by scales from 0.0005" to 0.020" in thickness that they have resisted corrosion for generations.

Unfortunately, the build-up of a thick mineral scale on the inside of a water heating coil, boiler or condenser tube seriously interferes with heat transfer. This loss in heat transfer results in considerably higher temperatures on the metal surfaces facing the fire or hot vapors which in turn leads to more rapid oxidation of the metal. Such failures are described as resulting from "overheating" or actual "burning." In this instance, direct combination of the metal with oxygen occurs according to the reaction: $2M + O_2 \rightarrow 2MO$. This takes place without the steps involved when metals corrode in water solutions.

The corrosiveness of water depends in a complicated manner upon the concentration of mineral matter, gases, organic matter and debris, some of which are tabulated in the box in the next column.

The sum of all the cations and anions gives the total mineral content of the water. Space does not permit a detailed discussion of the complicated interaction of very many of these substances upon the corrosion rates of metals. This belongs to the field of water chemistry.

(The influence of water composition will be discussed further next month.)

Cations	Anions	Gases	Organic Matter	Debris
Na^+	OH^-	O_2	Colloids	Silt
Ca^{++}	$CO_3^{=}$	CO_2	Phenol	Sand
Mg^{++}	HCO_3^-	H_2S	Coloring matter	Leaves
K^+	$SO_4^{=}$	SO_2	Oils & Fats	Seaweed
H^+ (pH)	NO_3^-	SO_3	Bacteria	Coal & Dust
Fe^{+++}	Cl^-	NH_3	Decomposing refuse	Coke
Cu^{++}	$PO_4^{\equiv}$	Cl_2	Inhibitors	Refuse

Brass Cupping, Drawing

(Continued from Page 1, Column 3)

difficulty would be experienced with cups breaking in drawing. Reduced friction would cut down the stress developed against the metal surface, which in reality is probably the primary cause of this breakage. Certain metal surfaces are harsh and resist drawing down into the die. Consequently, it is necessary to prepare a surface on the metal which will take the lubrication produced by the fabricator so that a film of oil or soap water exists between the surface of the die and the metal. It is therefore necessary that the metal surface be prepared satisfactorily to take the lubricant properly and wet the surface. Changing the lubricant to one which has more wetting ability without destroying proper lubrication may solve breakage in many instances.

Don't draw cups too deeply. It is the general practice when drawing a cup that the height of a draw cup drawn directly from sheet metal should not be more than 80% of the outside diameter of the cup. Cups of greater height in respect to the diameter can be obtained, but with greater difficulty and not without a considerable amount of experimenting.

Another factor which should be considered is the matter of tool design. The die radius should be relatively large and should be polished in the direction of the drawing operation, taking care to remove all scratches. The holding surface should be polished and lapped in the same manner. The press should be so adjusted that equal pressure is given all sections of the metal on the holding surfaces during drawing.

It is hoped that this article may serve to assist fabricators in ordering annealed metal and be of benefit in preventing metal failures.

NEW DEVELOPMENTS

This column lists items manufactured or developed by many different sources. None of these items has been tested or is endorsed by the Bridgeport Brass Company. We will gladly refer readers to the manufacturer or other sources for further information.

Unit springs consisting of nine individual small springs, each in a brass shell, have been developed for cushioning machinery to deaden noise and absorb vibration and shock. These standard units have a load capacity of 100 pounds and measure 2½ inches by 2 inches by ⅝ inch. They may be applied singly or in blocks and can be designed for curved or uneven surfaces to solve special cushioning problems. **(No. 460)**

A heat treating furnace is offered for general applications which is said to be suitable for continuous operating temperatures up to 2,000° F. It is equipped with a movable loading platform and features a push-button-controlled, motor-operated door, opening and closing mechanism. High precision controls are claimed to permit accurate temperature selection and maintenance. **(No. 461)**

An electro-thermostatic flow switch which detects the lack of proper cooling water required for adequate cooling of Ignitron tubes has been put on the market for resistance welding and other applications. It is available in either a 1½ gallon or 3½ gallon per minute size in both a 25 or 50/60 cy 220/440 v rating. An autotransformer supplies other ratings. **(No. 462)**

A safety lifter has been developed for handling coils of strip metal and objects of similar shape. Adjustable for a wide range of coil sizes, this product is described as particularly designed for handling coils in a horizontal position without first raising the coil. It is said to be non-magnetic and usable on any crane or hoist. **(No. 463)**

An inorganic one-coat finish is offered without priority as a protective coating for steel, brass and chrome plate which is claimed to be remarkably resistant to abrasion, heat and corrosion. It is applied by spray, dried for five minutes at 210° F., and baked 45 minutes at 350° F., after which it is reported to withstand temperatures up to 1000° F. **(No. 464)**

A steel type holder for marking has been put on the market to stamp identification into the ends of round work. It is said that the holder can be applied with segment type or logo dies from 1/32 to ½ inch in type height. The type locks into place and can be changed after removing a knurled head. **(No. 465)**

A cleaning powder is offered for solution in water which is said to remove oil, grease, drawing compounds, and clean surface oxide from copper, aluminum, and nickel. The maker says it will also clean galvanized metal and is suited to clean steel prior to painting. Application can be made in washing machines, still dip tanks, and by hand-applied brush. **(No. 466)**

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WELDING ROD—For repairing cast iron and steel, fabricating silicon bronze tanks.

LEDRITE* ROD—For making automatic screw machine products.

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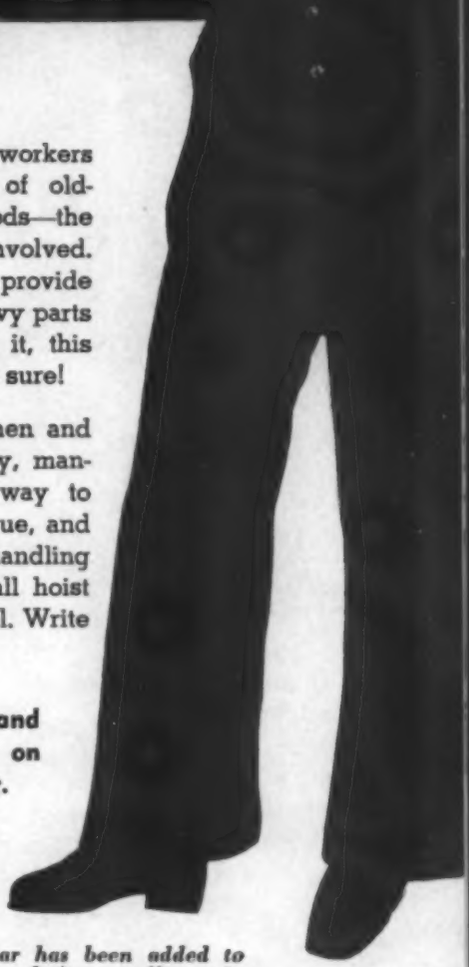

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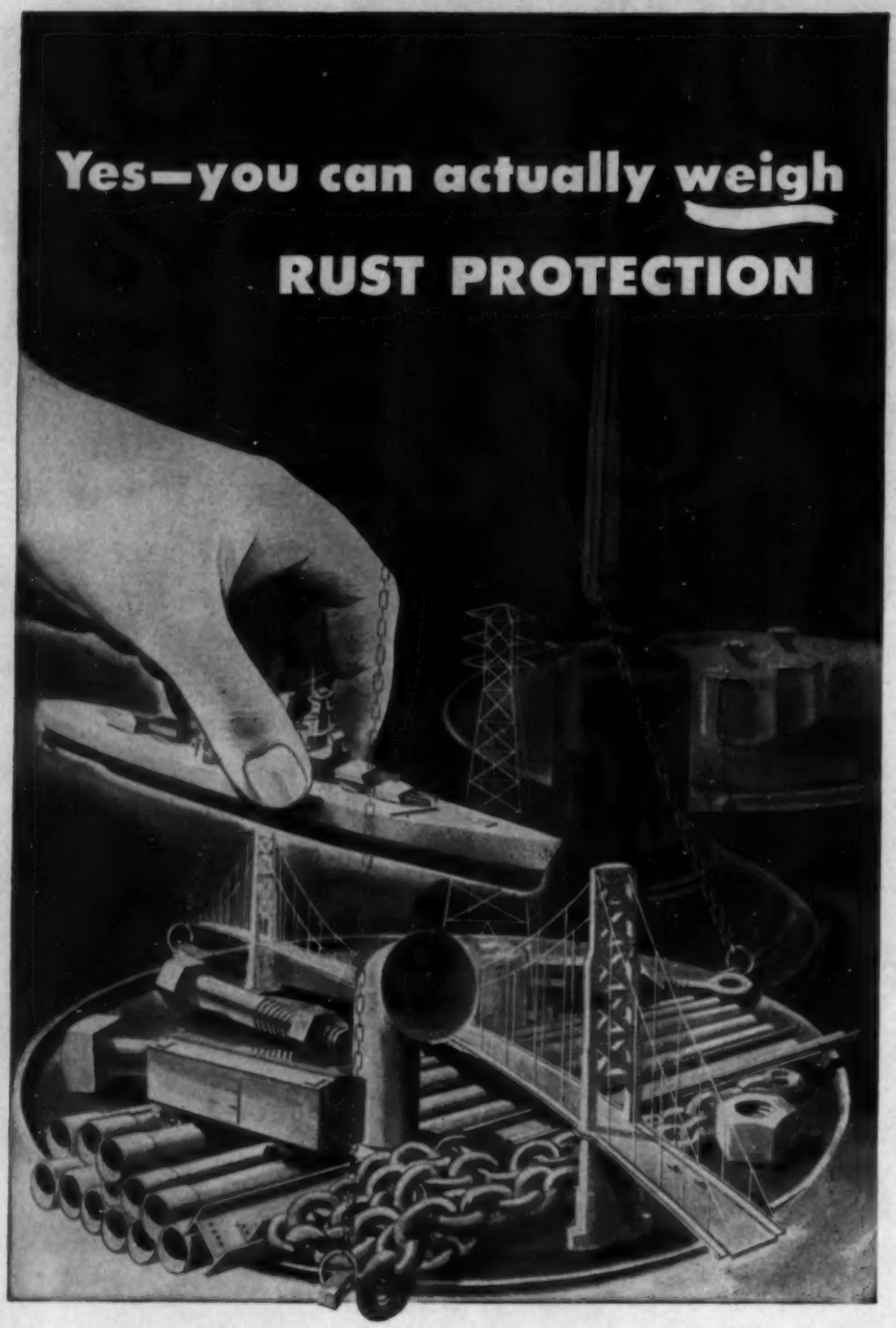

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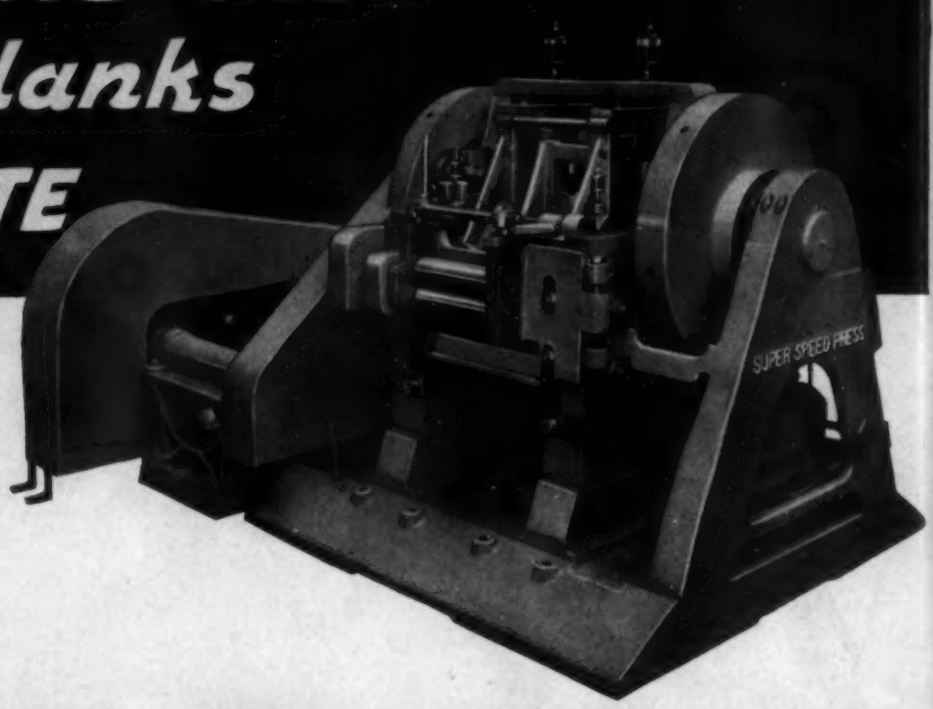

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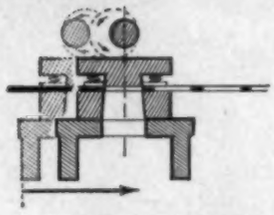

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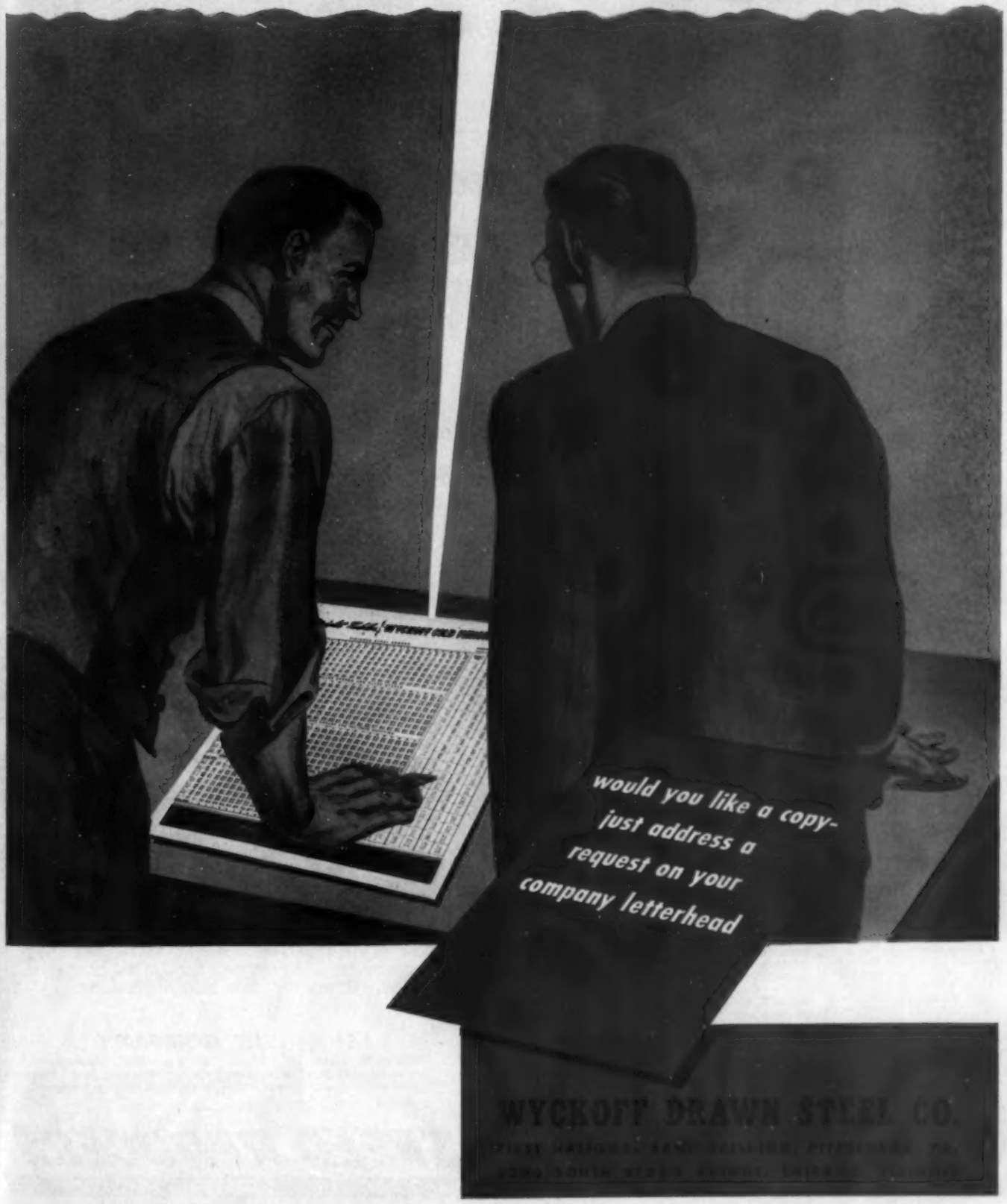
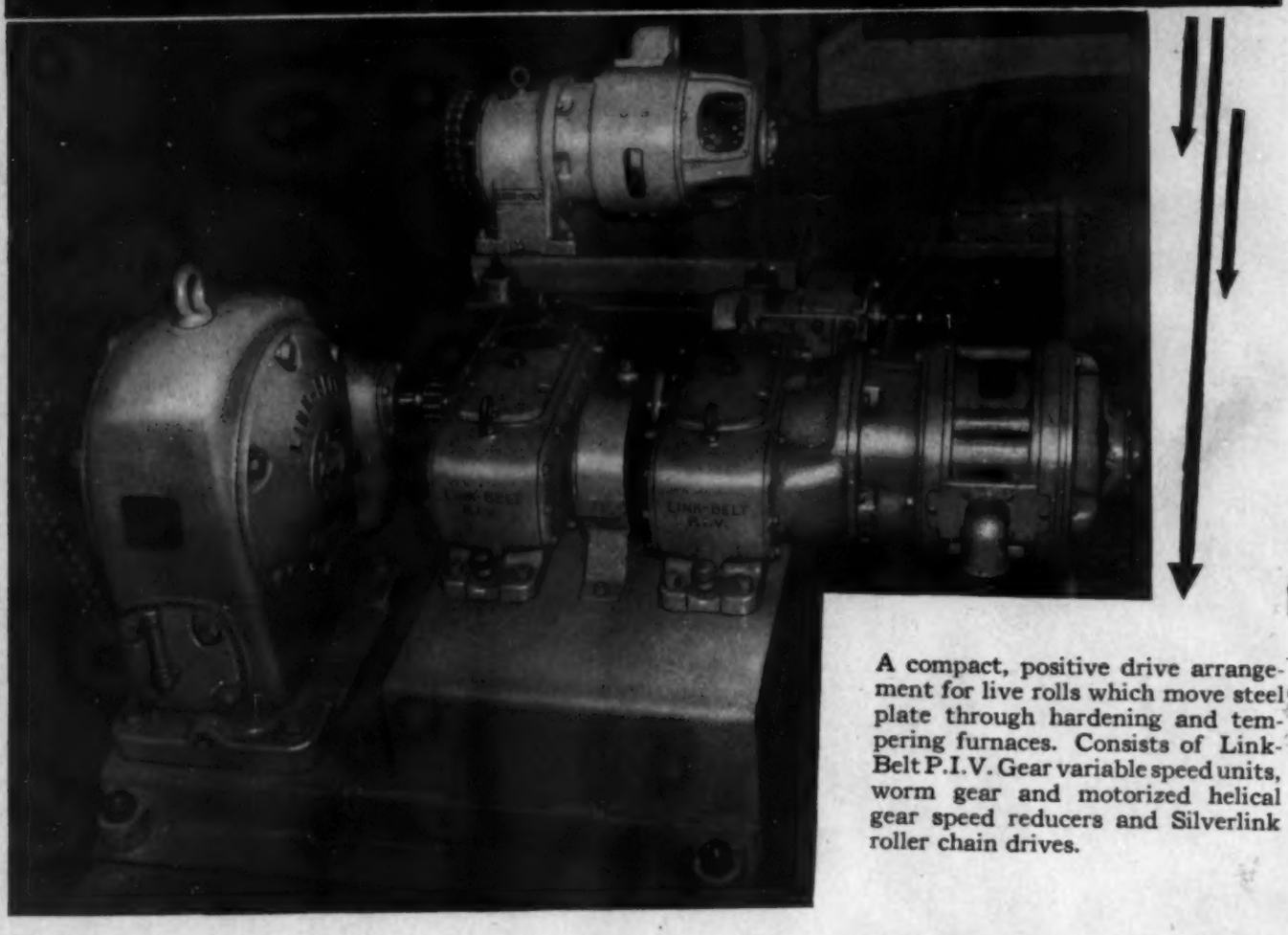


How to Assure Correct Speed Reducer Application



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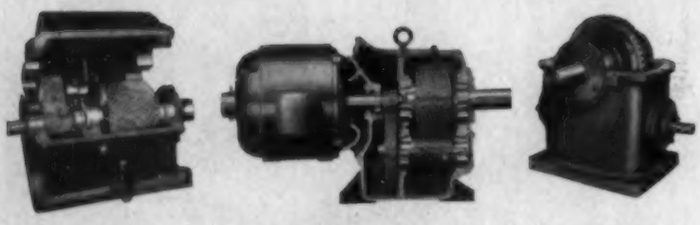

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WORM GEAR REDUCERS

Link-Belt worm gear reducers for large ratios and flexibility of arrangement and where drives of right-angle type or other shaft combinations in single and double reductions are required. Horizontal and vertical types — adaptable to almost any form of speed reduction from 1100 to 115,000-inch pounds torque. Ratios 3¼ to 8000 to 1.

• It's important in choosing a speed reducer to have an experienced organization to call on for engineering advice. Because Link-Belt does have the experience and because the Link-Belt line of speed reducers is so complete, you can be certain of unbiased recommendations as to type and size and complete performance satisfaction when you use Link-Belt speed reducers.

The Link-Belt line includes herringbone gear, worm gear and motorized helical gear reducers in practically any ratio and size you may require—the correct type for every application. Complete data sent on request.

LINK-BELT COMPANY

Philadelphia Plant, 2045 W. Hunting Park Ave.; Chicago, Indianapolis, Atlanta, Dallas, San Francisco, Toronto, Pittsburgh, Cleveland, Detroit. Branch offices, warehouses and distributors in principal cities.

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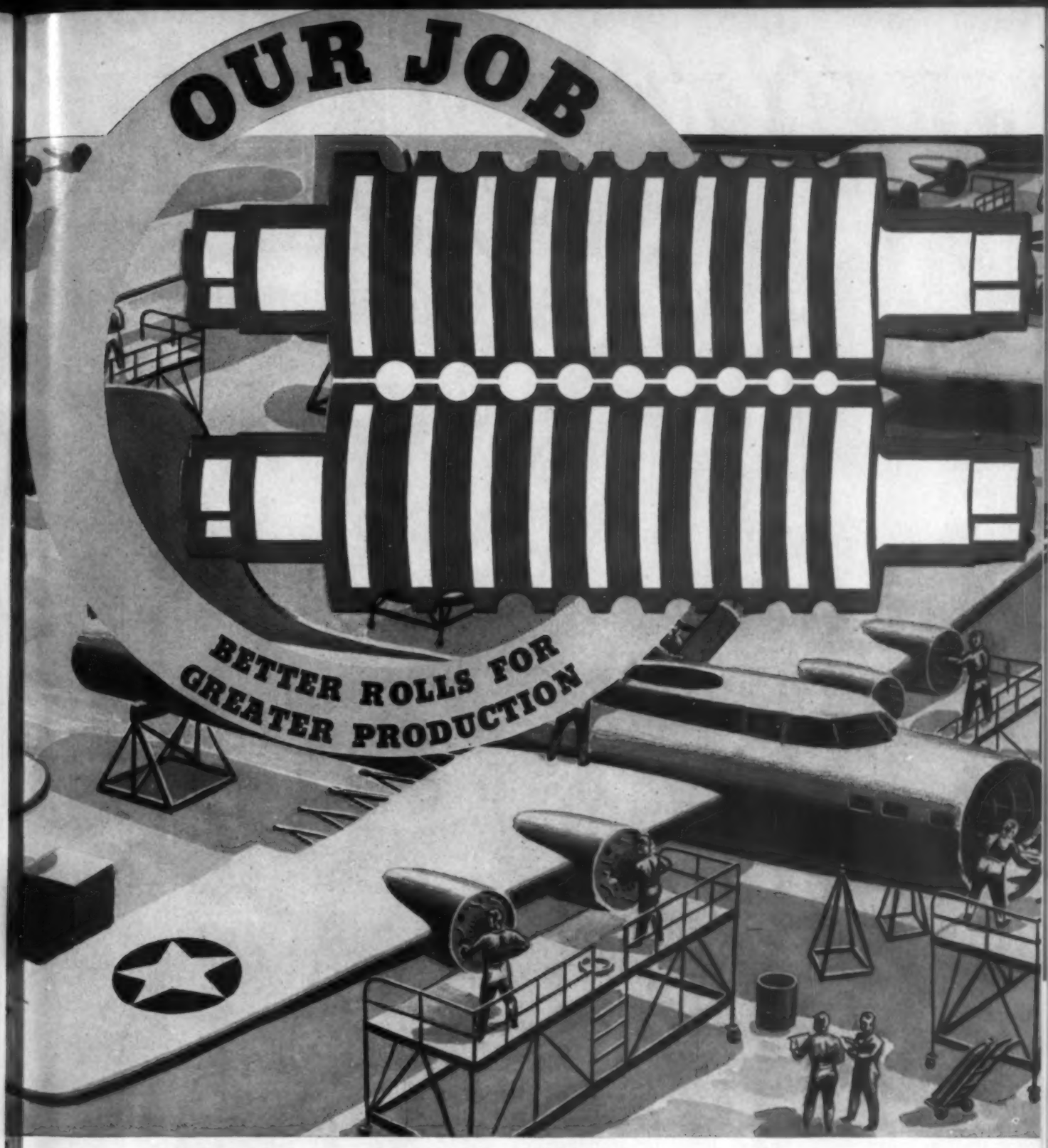
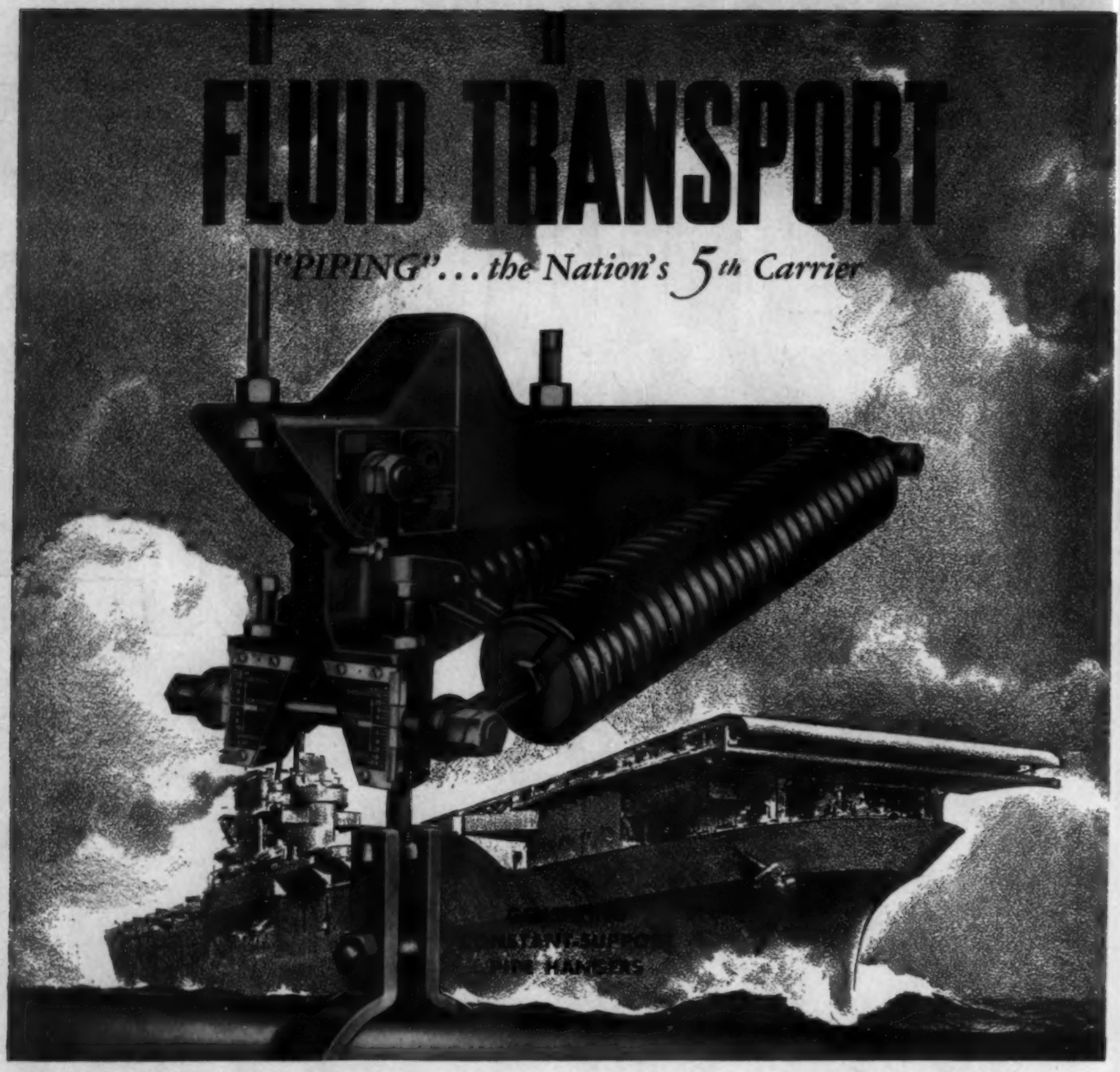
LINK-BELT SPEED REDUCERS



Our nation's plans for victory call for steel and more steel—
SPEED PRODUCTION WITH PITTSBURGH ROLLS

PITTSBURGH ROLLS

PITTSBURGH ROLLS DIVISION of
BLAW-KNOX CO.—"Steel's Partner" • PITTSBURGH, PA.



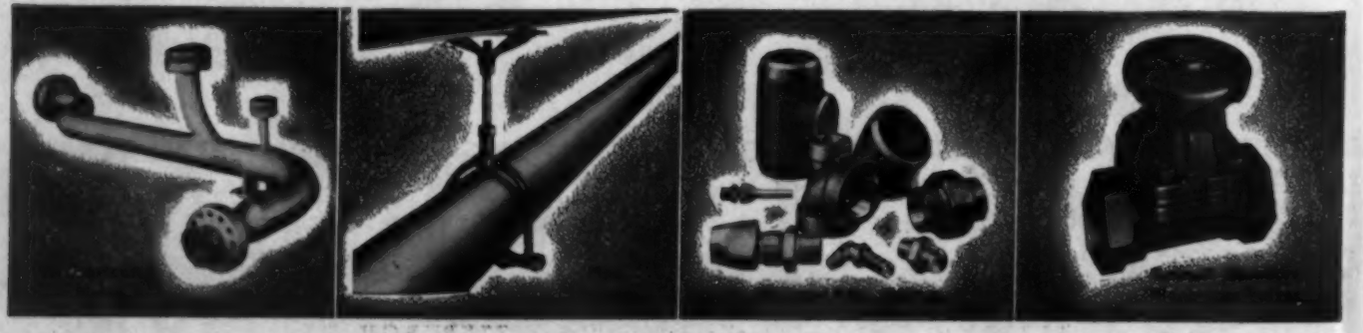
SEAGOING PIPING TAKES AN EXTRA BEATING. Piping must be properly engineered and fabricated to withstand all the punishment that goes with a high pressure steam installation *plus* the extra shocks of rough seas.

Grinnell is meeting these and similar extreme demands for specially engineered piping systems both afloat and ashore. Grinnell plants offer the most modern facilities for fabricating the connecting links which convert a pile of pipe into a complete piping system for efficient FLUID TRANSPORT.

For new war construction and maintenance and repair of existing piping, call Grinnell Company, Inc., Executive Offices, Providence, Rhode Island. Plants and offices throughout the United States and Canada.

GRINNELL

WHENEVER **PIPING** IS INVOLVED



Work-Horses of the war

Tugboat Service Puts Marine Diesels "Through Their Paces"

ArmaSteel*

There's not much glamour to the tough little tugboats of the harbor fleet, with their "bearded" prows and ample beam. Yet in those stocky hulls are powerful Diesel engines, capable of swinging giant ships against tide and wind; and on the bridge are tugboat captains whose seamanship is respected throughout the maritime world. Twenty-four hours a day, tugboats are on the job for the Navy and Merchant Marine.

The use of ArmaSteel in tugboat Diesels represents one of many applications for this versatile metal. Cast to exact specifications, it is conserving time and critical materials in the manufacture of tanks, trucks, armored cars, landing boats, sub-chasers, machine guns and carbines... reducing tool wear and increasing production on scores of assignments. Make use of ArmaSteel in your present operations, and keep it in mind for future developments.

SAGINAW MALLEABLE IRON
DIVISION OF GENERAL MOTORS
Saginaw, Michigan

*Reg. U. S. Pat. Off.

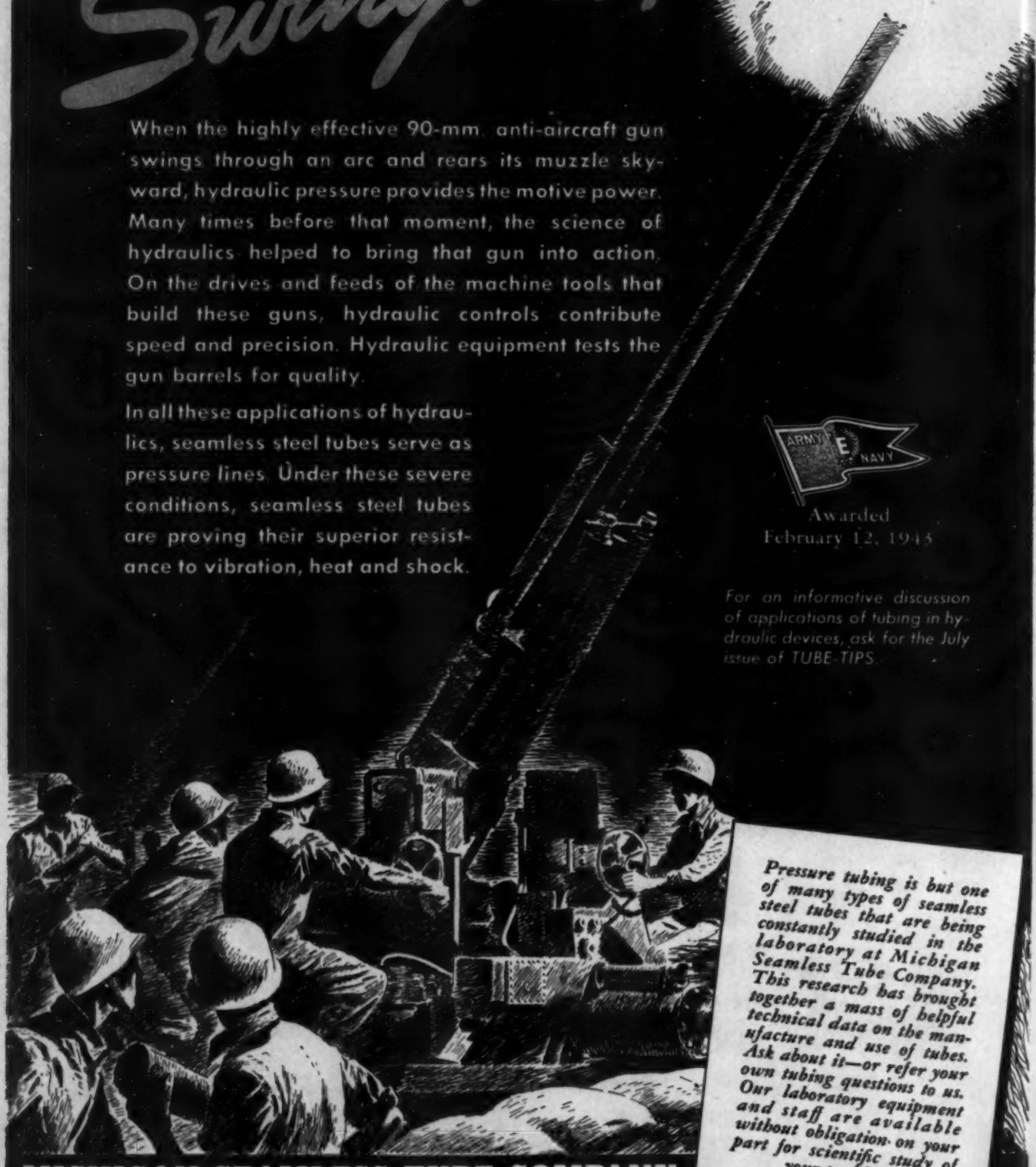
CAST FOR A LEADING ROLE IN INDUSTRY

HYDRAULIC PRESSURE

Swings it!

When the highly effective 90-mm. anti-aircraft gun swings through an arc and rears its muzzle skyward, hydraulic pressure provides the motive power. Many times before that moment, the science of hydraulics helped to bring that gun into action. On the drives and feeds of the machine tools that build these guns, hydraulic controls contribute speed and precision. Hydraulic equipment tests the gun barrels for quality.

In all these applications of hydraulics, seamless steel tubes serve as pressure lines. Under these severe conditions, seamless steel tubes are proving their superior resistance to vibration, heat and shock.



ARMY E NAVY

Awarded
February 12, 1943

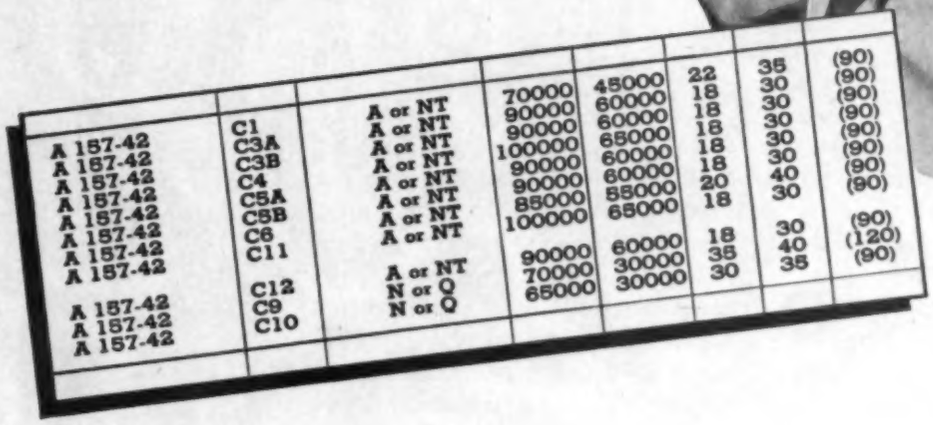
For an informative discussion of applications of tubing in hydraulic devices, ask for the July issue of TUBE-TIPS.

Pressure tubing is but one of many types of seamless steel tubes that are being constantly studied in the laboratory at Michigan Seamless Tube Company. This research has brought together a mass of helpful technical data on the manufacture and use of tubes. Ask about it—or refer your own tubing questions to us. Our laboratory equipment and staff are available without obligation on your part for scientific study of your problems.

MICHIGAN SEAMLESS TUBE COMPANY

SOUTH LYON MICHIGAN

"JUST WHAT THE DOCTOR ORDERS"



A 157-42	C1	A or NT	70000	45000	22	35	(90)
A 157-42	C3A	A or NT	90000	60000	18	30	(90)
A 157-42	C3B	A or NT	90000	60000	18	30	(90)
A 157-42	C4	A or NT	100000	65000	18	30	(90)
A 157-42	C5A	A or NT	90000	60000	18	30	(90)
A 157-42	C5B	A or NT	90000	60000	18	40	(90)
A 157-42	C6	A or NT	85000	55000	20	30	(90)
A 157-42	C11	A or NT	100000	65000	18		
A 157-42	C12	A or NT	90000	60000	18	30	(90)
A 157-42	C9	N or Q	70000	30000	35	40	(120)
A 157-42	C10	N or Q	65000	30000	30	35	(90)

You can buy steel castings to a wide variety of specifications, to suit the job, just as easily and as accurately as a doctor's prescription is filled.

For example, suppose you require a steel that will stand up under extremes of pressure and temperature. You'll find in the Steel Founders' Specification Chart eleven standard steels that meet such conditions—all available in cast form.

The Specification Chart prepared by the Steel Founders' Society affords you the choice of nearly a hundred steels, each designed to provide a combination of physical properties that will meet certain requirements.

Whatever properties you want—tensile strength, rigidity, elasticity, resistance to high temperatures, pressures and corrosion, weldability, adaptability to various heat treatments—all these may be selected over a wide range. And all have been tested and proved satisfactory for the work they are expected to do.

A copy of this chart—sent free on request—will contribute a new element of *sureness* to your steel casting specifications. The Steel Founders' Society of America, Cleveland, Ohio.

MODERNIZE AND IMPROVE YOUR PRODUCT WITH

STEEL CASTINGS

Gets into tight spots!

LOOK at that O.D., and you'll know why Apex stud setters get into hard-to-reach places with such ease and precision—even in the hands of semi-skilled workers. These simple, trim, clean-cut stud setters have small body diameters for their capacities. They are extremely easy to adjust for length of thread on stud and maintain proper adjustment in service. Simple design plus ample ruggedness and toughness make them fine tools for either hand or power applications. Four different sizes will set studs up to 1¼". You can get them with Morse taper, hexagon, T-handle and male or female square drive shanks, or combination T-handle with female square for use with a torque wrench. Write for Bulletin No. 101 for all the facts.

APEX

THE APEX MACHINE & TOOL CO., DAYTON, OHIO

Manufacturers of Safety Friction Tapping Chucks, Quick Change and Positive Drive Drill Chucks, Vertical Float Tapping Chucks, Parallel Floating Tool Holders, Power Bits for Phillips, Slotted Head and Clutch Head Screws, Hand Tools for Phillips and Clutch Head Screws, Aircraft Universal Joints, Plain and Universal Joint Socket Wrenches.

Ol' Red Wabbler says:

Nironite C Rolls in four steel plants

have established

outstanding tonnage records

reduced costs

In four of the Nation's great steel plants Nironite C Rolls, on continuous mills, have established new records in finishing flats, small strip bars and hoops. Operating men prefer and select them above all others.

There are reasons. They are high nickel chromium of the grain or indefinite chill type. They have increased resistance to spalling. They give better finish and greater tonnage per grind. Their body structure very closely approaches that of true chill and the bodies and centers and necks are soft and strong.

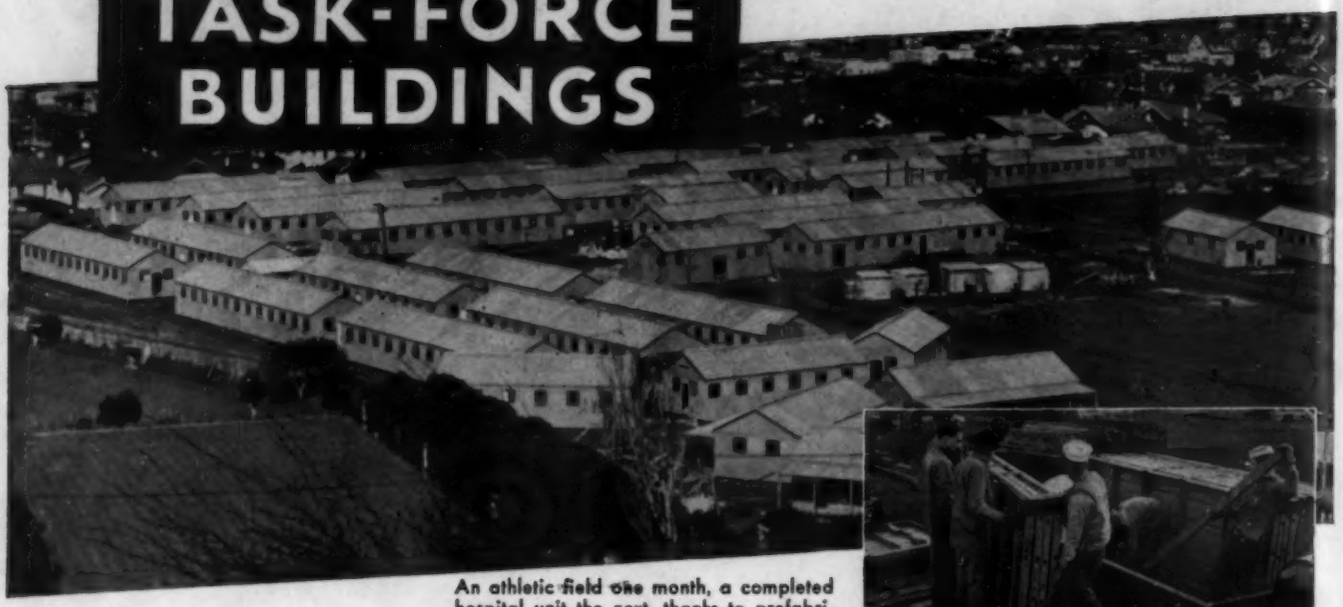
You can get the most for your roll dollar — specify Mackintosh-Hemphill Nironite C Rolls.

Other Mackintosh-Hemphill Products:

Rolling Machinery . . . Shape Straighteners . . . Strip Coilers . . . Shears . . . Levellers . . . Pinions . . . Special Equipment . . . Iron-Steel Castings . . . The NEW Abramsen Straightener . . . Improved Johnston Patented Corrugated Cinder Pots and Supports . . . Heavy Duty Engine Lathes.

MACKINTOSH-HEMPHILL COMPANY—Pittsburgh and Midland, Pa.

On TASK-FORCE BUILDINGS



An athletic field one month, a completed hospital unit the next, thanks to prefabrication and ease of construction.

Unloading steel sections for construction of U. S. Mobile Base Hospital.

Task-Force Building of Prefabricated Steel erected in a few hours by officers and men.

Interior of a hospital building, insulated and comfortable.

Official U. S. Navy Photos

An EGYPTIAN Specification Finish on Task-Force housing projects is another recent example of the efficiency of these special finishes. Application to the prefabricated steel sections which nest compactly in ships' holds to be transformed at the far corners into hospitals, mess halls and living quarters for our armed forces, demonstrates EGYPTIAN'S capacity to "take it." Speed, and the ability to withstand rough handling and the extremes of heat and cold, are prime essentials. Task-Force buildings today may be civilian housing tomorrow and the manufacturer who is interested in this type of work would do well to look into EGYPTIAN FINISHES.

Our experience in furnishing Specification Finishes for wartime needs as well as a knowledge acquired during a half century of making industrial finishes assures the user of EGYPTIAN the correct finish best suited to individual requirements.

Your inquiry will receive prompt attention.

THE EGYPTIAN LACQUER MANUFACTURING CO.
ROCKEFELLER CENTER—NEW YORK, 20, N. Y.

EGYPTIAN *Superior* FINISHES

Serving and Conserving —

DOING *TWO* VITAL WAR JOBS . . . RUSTLESS is proud that it has the facilities and the "know-how" to do two war jobs of singular importance.

First, we are producing more Stainless Steels than any other plant in the nation. That is because we are the only plant whose entire resources are devoted to making this one, vital, strategic material and nothing else. Already Stainless Steel's exceptional properties of high tensile strength and remarkable resistance to corrosion by heat, acid and rust have made it a must in the production of the most vital war equipment.

Second, the unique RUSTLESS processes are conserving two metals that are critically scarce. These metals . . . Chromium and electrolytic Nickel . . . are essential, not only for the manufacture of Stainless Steel but for many other war requirements as well. RUSTLESS has largely "by-passed" their use by the discovery of ways to achieve equal results through the use direct in the furnace of ores and through the recovery of stainless steel scrap, both of which are in ample supply.

Thus, RUSTLESS is both *Serving* and *Conserving;* two jobs that we will continue to do with all our might and with all our resources throughout the war and in preparation for the peace to come.

BUY U. S.
WAR BONDS
AND STAMPS

ARMY E NAVY

RUSTLESS

CORROSION AND HEAT-RESISTING
STAINLESS STEELS

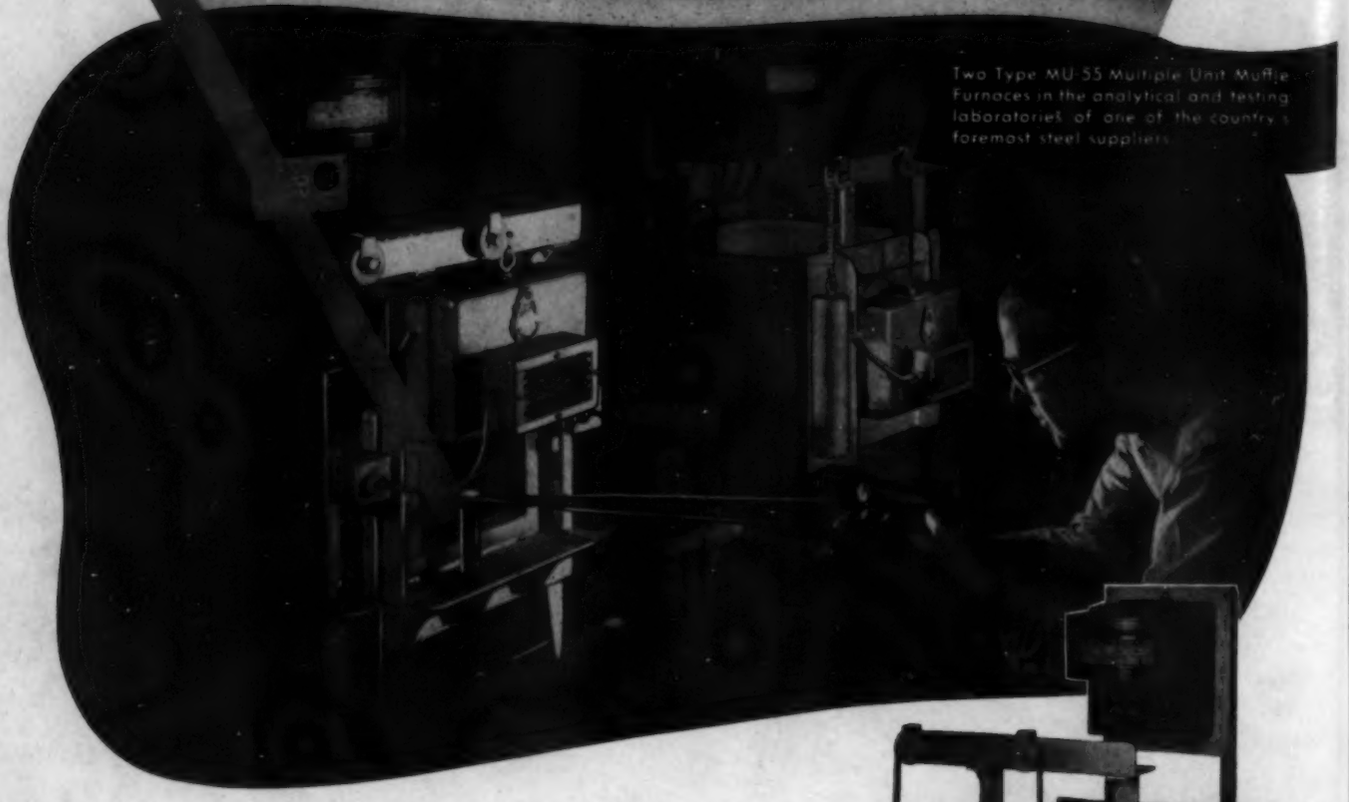
RUSTLESS IRON AND STEEL CORPORATION • • • BALTIMORE, MARYLAND

FOR GENERAL LABORATORY AND LIGHT TOOL ROOM WORK

Multiple Unit

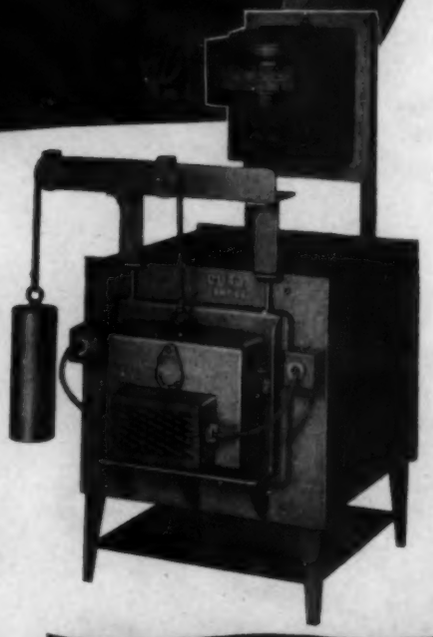
TYPE MU-55 MUFFLE FURNACE

WITH CONTROLLING PYROMETER



Two Type MU-55 Multiple Unit Muffle Furnaces in the analytical and testing laboratories of one of the country's foremost steel suppliers

For general laboratory and light tool room work, the MU-55 Multiple Unit Muffle Furnace, with controlling pyrometer, provides a sturdy small furnace well adapted to general service. It is used in many of the large steel and other industrial laboratories for test heat treatments. Bulletin HD-637 has all the details — send for your copy.



Type MU-55 Muffle Furnace with controlling pyrometer

HEVI DUTY ELECTRIC COMPANY

LABORATORY FURNACES MULTIPLE UNIT ELECTRIC EXCLUSIVELY

TRADE MARK REG. U.S. PAT. OFF.

MILWAUKEE, WISCONSIN

Why Manganese is used in

ENGINEERING STEELS

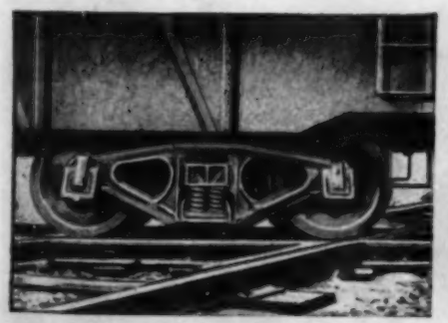
Additions of 10 to 16 per cent manganese to steel greatly increase a steel's resistance to wear, and thereby broaden its applications in engineering jobs. These manganese steels . . . instead of quickly wearing away under conditions combining severe pressure, shock, and abrasion . . . will become harder through use, and will last longer.

The ability of high manganese steels to workharden serves industry in important and varied applications. Manganese steel castings are used for railway frogs and crossings, rock-crusher parts, steam-shovel dipper teeth, dredge-bucket lips, centrifugal pump parts for gravel dredges. The chief application of rolled manganese steel is in rails used for special service, and for light forgings subjected to heavy wear.

Besides manganese, we produce other ferro-alloys and metals . . . such as chromium, silicon, vanadium, tungsten, columbium, boron, calcium, and zirconium . . . used in alloy-steel making. We do not make alloy steels, but we have over 35 years of experience with their development and use. If you have a problem in the selection or application of an alloy steel, call on us.

BUY UNITED STATES WAR BONDS AND STAMPS

Bulldozers **used in road construction utilize the strength and wear-resistance of manganese steels in the blade, in axle and spline shafts, steering arms, drive pinions, structural parts, gears, and treads.**



Railway crossings, **frogs, and rails are made of high manganese steels to withstand the wear and the weight of heavily loaded trains that can not be delayed for road repairs.**

Dipper bucket teeth **are cast of Hadfield steel that increases in hardness and life-length under abrasive wear from gravel and rock in construction work.**

Jaw crushers **used in breaking up rock have wearing parts made of Hadfield steel because the steel gains longer life from cold working under heavy pressure and severe abrasion.**

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Unit of Union Carbide and Carbon Corporation
30 East 42nd Street New York, N. Y.
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Electromet
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Ferro-Alloys & Metals

made to measure
for your individual needs

● Every Birdsboro "Special" Roll is individually "tailored" to the job it must perform. They are not made to meet general or average conditions. Each is engineered to its specific job —its analysis and physicals carefully planned for its purposes. That is why Birdsboro "Special" Rolls have such an outstanding reputation for giving longer roll life, greater tonnages and more rolling accuracy. If *yours* is a roll problem, it will pay you to consult Birdsboro.

For blooming mills, billet mills, structural mills, bar mills, rolling mild, structural shell, gun barrel, seamless tube and special alloy steels. Also for 4-high strip mill back-up rolls.

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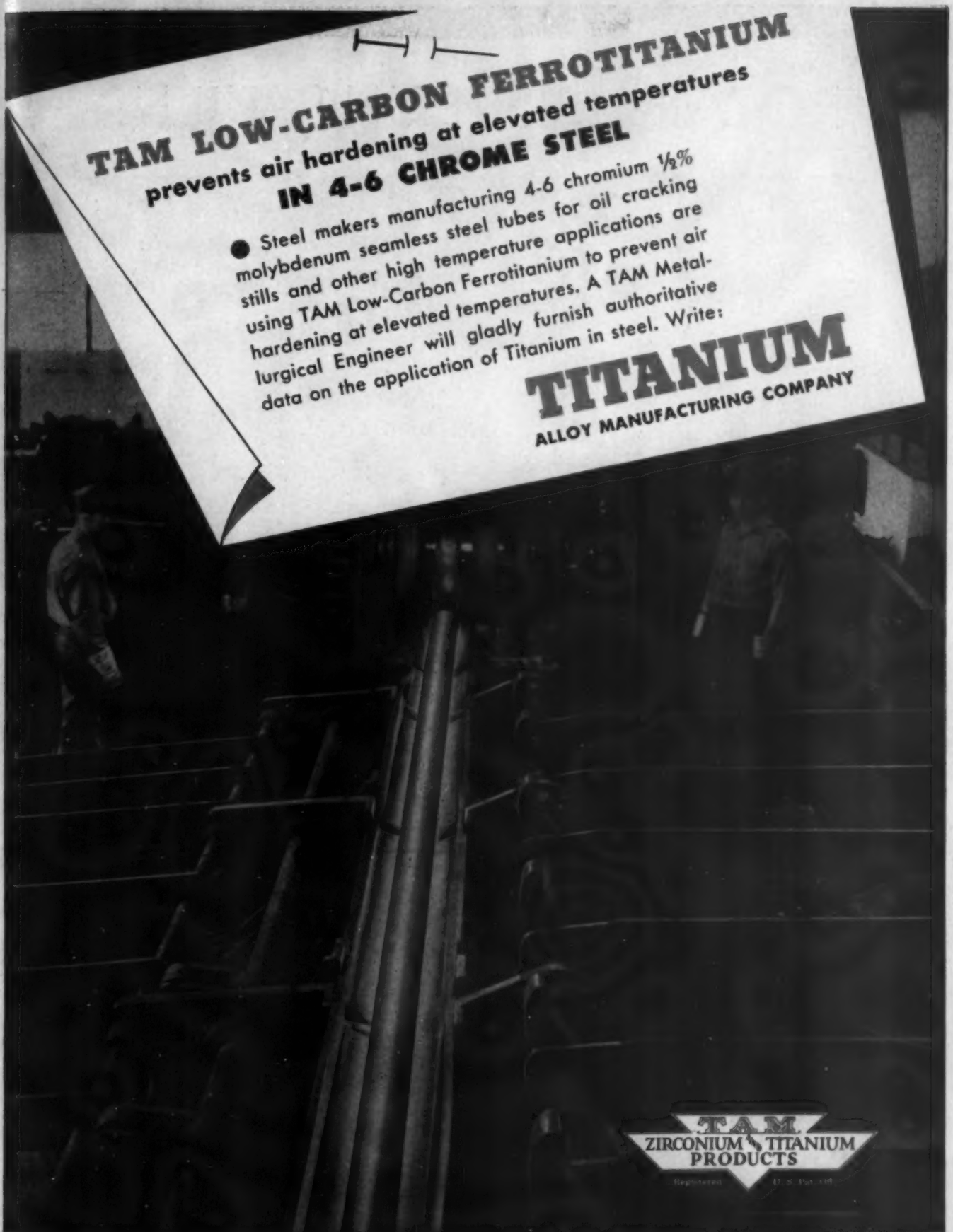
BIRDSBORO

ROLLS


TAM LOW-CARBON FERROTITANIUM
prevents air hardening at elevated temperatures
IN 4-6 CHROME STEEL
● Steel makers manufacturing 4-6 chromium ½% molybdenum seamless steel tubes for oil cracking stills and other high temperature applications are using TAM Low-Carbon Ferrotitanium to prevent air hardening at elevated temperatures. A TAM Metallurgical Engineer will gladly furnish authoritative data on the application of Titanium in steel. Write:
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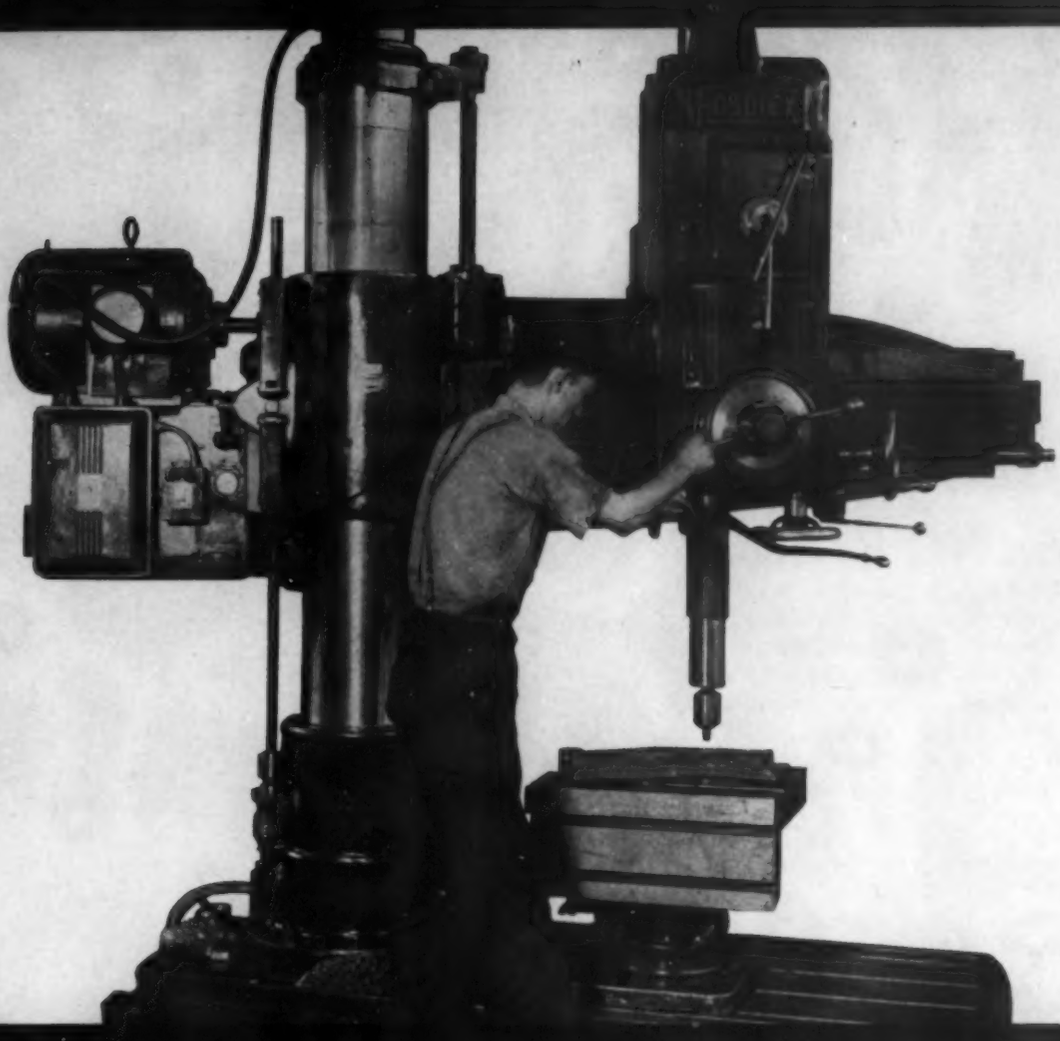
Materials sintered without fines, eliminating screening and rejects.

Any available gas, oil or pulverized solid fuel may be used.

Low power consumption—7 to 8 kwh per ton of sinter.

F. L. SMIDTH & CO.

60 E. 42ND STREET NEW YORK, N. Y.



MORE AUTOMATIC SCREW MACHINES FOR *"All Out"* PRODUCTION

FOSDICK *Hydraulic* RADIALS

As we broaden our fighting fronts around the globe, ammunition, small arms, cannon and mechanical equipment becomes more vital than ever.

Here a Fosdick Radial is drilling and reaming steel castings used in making Automatic Screw Machines to help produce more of these vital materials—faster.

The wide range of feeds and speeds—all controls conveniently located on the head—the full hydraulic circuit for manipulating controls are features that make for ease of operation and versatility.

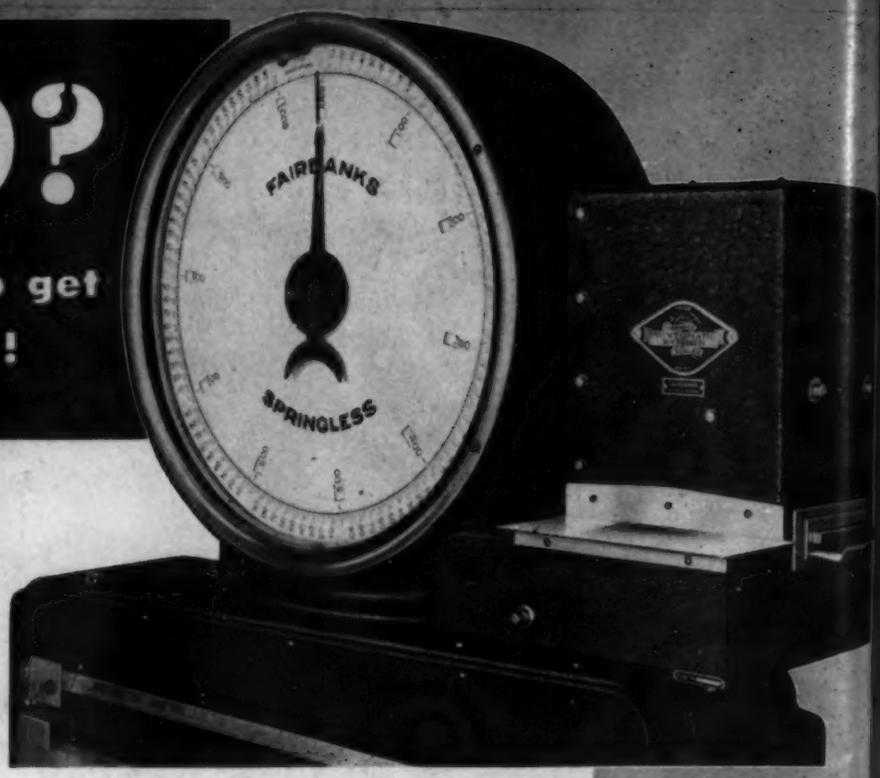
No matter what your drilling, reaming, facing, tapping or boring operation may be, if it can be done on a Radial you can do it easier, better and at less cost on a Fosdick.

For full details of construction and operation ask for Fosdick Radial Bulletin R. S.

FOSDICK MACHINE TOOL COMPANY
CINCINNATI · · · OHIO

GOOD?

They have to be to get where they are!



In good light or bad . . . operated by experienced weighmen or novices . . . weighing all kinds of commodities . . . Fairbanks Printomatic Scales have proved to the world that they have what it takes! They eliminate human errors, speed up weighing operations, and provide a PRINTED record showing what was weighed, who weighed it, and when.

Fairbanks Scales have proved their reliability through their 113 years of service. Each part, carefully designed for its specific function and built with precision, guarantees your incoming, outgoing, and processing weight operations.

The Printomatic records the correct weight automatically, prints it on a roll tape, weigh ticket, or combination of both, or on gummed tickets. Adaptation of Fairbanks Printomatic Scales to weighing problems, simple or complicated, is practically unlimited. Why not investigate what these scales can do for you? Fairbanks, Morse & Co., 600 S. Michigan Ave., Chicago, Ill.

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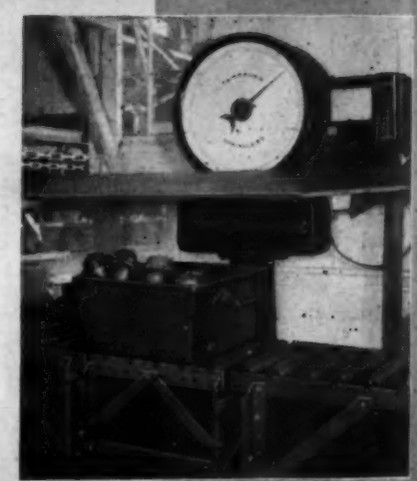
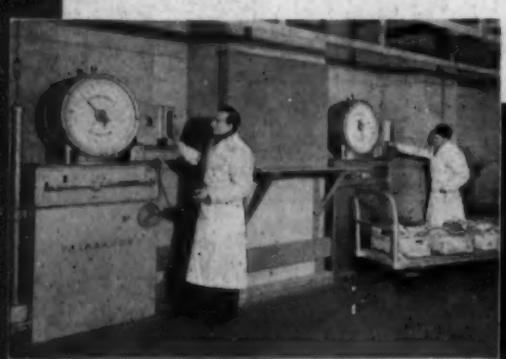


Fairbanks Printomatic Conveyor Scale → keeps printed record of piecework in foundry.



↑ Fairbanks Printomatics recording meat shipments to retailers. Each of 221 different kinds of meat is given a designating number.

↑ Fairbanks Coal Mine Car Scale with Printomatic weighs mine cars in motion, protecting employer and miner.

Fairbanks Portable Dial → Scale with Printomatic weighing and printing records of meat to retailers.

FAIRBANKS-MORSE

DIESEL ENGINES
PUMPS
MOTORS
GENERATORS
SCALES

WATER SYSTEMS
FARM EQUIPMENT
STOKERS
AIR CONDITIONERS
RAILROAD EQUIPMENT

FAIRBANKS SCALES

Scales

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STEEL

The Magazine of Metalworking and Metalproducing

JULY 12, 1943

Volume 113 *Number 2*

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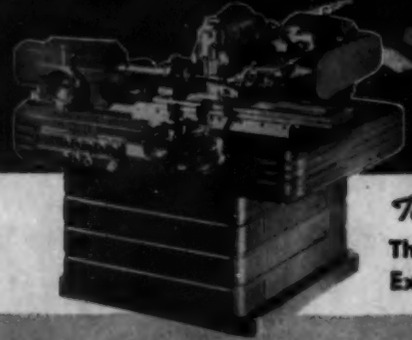
PRECISION *Thread Grinding*

. . . the modern method of producing accurate threads

Precision thread grinding has already become a vital step in the accelerated production of accurate threaded parts by American industry. Many manufacturers of parts for war material are grinding threads with Ex-Cell-O Precision Thread Grinders after the threaded parts are hardened, or grinding threads from the solid after heat treatment, because only by this method can they obtain uniformly, a high standard of accuracy in thread form, size, and finish. . . . With an Ex-Cell-O Precision Thread Grinder, you, too, can produce accurately ground threads on a profitable production basis. You can not only take advantage of today's great demand for precision threaded parts, but also provide for the future, when the precision grinding of all threaded parts in which accuracy is essential will undoubtedly be required.

EX-CELL-O CORPORATION • DETROIT



To the left: Ex-Cell-O Style 31 Precision Thread Grinder (this is one of nine styles of Ex-Cell-O precision thread grinding machines).

Precision THREAD GRINDING, BORING AND LAPPING MACHINES • TOOL GRINDERS • HYDRAULIC POWER UNITS • GRINDING SPINDLES • BROACHES • CONTINENTAL CUTTING TOOLS • DRILL JIG BUSHINGS • DIESEL FUEL INJECTION EQUIPMENT PURE-PAK CONTAINER MACHINES • R. R. PINS AND BUSHINGS • PRECISION PARTS

XLO

EX-CELL-O *for* PRECISION

STEEL
July 12, 1943

2,000,000 TONS OF STEEL: Every producer, distributor, fabricator and consumer of steel has a big stake in the "Steel for Victory" drive. The objective is to get an additional 2,000,000 tons of steel out of production or out of other channels during the last half of 1943.

Sponsors of the program look to three sources for this additional tonnage—increased output from existing facilities, better distribution through a "share the steel" campaign and speeding up of the steel expansion program so that some facilities will be in production ahead of schedule.

While many steel executives believe the last-named expedient offers the best possibilities, it happens that the first tangible successes in the drive have come from the "share the steel" campaign. During the first few days of the drive scores of steel consumers in widely scattered sections of the country (p. 72) voluntarily reduced their orders on mill books by 75,000 tons. This is only 3.75 per cent of the 2,000,000-ton goal, but it is an encouraging beginning.

Getting more output out of existing facilities will be difficult because of the necessity of occasionally shutting down hard-pressed facilities for repairs. More efficient distribution, arising from a better balance in inventories among users, has definite possibilities as attested by the 75,000 tons already saved. Even more promising is speeding of the construction program because in some instances the delivery of one or more vital pieces of equipment may advance the completion date of a furnace or mill by precious weeks or months.

Steel men know that achieving this goal of an additional 2,000,000 tons is a stiff assignment, but the industry has licked far more formidable problems. This one can be licked.

• • •

FEWER, BUT STRONGER: In spite of the impetus of war, there are fewer foundries in the United States today than there were two years ago. To be exact, the number of casting plants now stands at 4802, compared with 4812 in 1941.

This decrease, as revealed in the 1943-44 edition of Penton's Foundry List (p. 94), does not mean that American foundries are backward in the war effort. On the contrary, capacity and production are up sharply as a result of war activities. What has happened is that numerous small or poorly located casting shops have closed down, while fewer but much larger plants have been built in response to war demand.

Steel foundries have received the greatest impetus from the war. The number of plants has increased in two years from 298 to 334 and since the beginning of this emergency capacity has more than doubled.

Taking the foundry industry as a whole, the marked increase in capacity which is concentrated in fewer but more efficient plants is a sign of strength.

• • •

POSTWAR PARADISE: In reading the postwar program drafted by the executive committee of the United Automobile Workers—CIO, one is struck by its close adherence to the views openly or secretly held by the more visionary members of the inner circle of new dealers.

The planks of the program (p. 83) call for union labor representation in every conceivable postwar activity of the government; maintenance of labor standards during the reconversion period "against any attempt . . . to lengthen hours, reduce wages or lower living standards; full guarantees to all members of the armed forces including a $2500 'separation bonus'"; "government or municipal ownership and operation of monopolistic industries and of industries strategically necessary to the national safety"; broad government control of industrial activities; a huge government construction program involving housing, schools, highways, hospitals, power projects, etc.; and reduction of the work week to 30 hours without reducing wages.

It is difficult to see how intelligent men sincerely interested in the future of the union movement or in the future welfare of union members can earnestly support some of the planks of this platform.

(OVER)

If most of the plans proposed actually were carried out, union members in common with all other citizens would find themselves living in a nation guided by dreamers and ruled by bureaucrats. The slavery of the people to these masters would so thoroughly impair the profit motive that private enterprise would be destroyed. Collectivism of some sort would supplant our capitalistic system and unions would lose all of their power to the state.

A practical postwar plan should provide for work and responsibility as well as rewards and benefits. The UAW proposal is long on what one receives from the pictured postwar paradise but short on what one contributes to it.

• • •

SUBSTITUTE FOR OIL? In view of the difficulty in maintaining adequate supplies of fuel oil in the Atlantic states, many manufacturers are being forced to adapt their oil-burning boiler plants to the use of coal. The cost of conversion is considerable and it is not easy to obtain some of the equipment required. Naturally, these handicaps raise the question as to whether or not there is an acceptable substitute for fuel oil other than coal.

Preliminary tests indicate that the possibility of substituting colloidal fuel for oil should be investigated thoroughly. The emergency fuel used in these tests (p. 98) consisted of a mixture of 40 per cent pulverized bituminous coal and 60 per cent No. 6 (bunker C) fuel oil. It is estimated that if a colloidal fuel of this type can be adapted to oil-burning equipment successfully, it will reduce fuel-oil consumption in boiler plants about a third.

• • •

FIRE POWER IS ANSWER: Fire power is a term of great significance in this war. It means the weight of ammunition that can be shot from a single gun or from all the guns of a fighting unit within a specified period of time.

Two years ago American aircraft—fighters as well as bombers (p. 100)—were deficient in fire power. Today they have it in abundance and tomorrow they will have it far in excess of anything the enemy can develop.

War contractors who have wondered why there have been so many changes in aircraft design will find part of the answer in fire power. In the race to beat the enemy on this score, frequent changes in gun mounts, turrets, armor, etc. have been necessary. The result, as measured in air supremacy all over the world, is highly gratifying.

• • •

HECTIC NEW ORLEANS: Those to whom the mention of New Orleans brings to mind memories of the Mardi Gras, the old French quarter and Creole cooking will be amazed at the extent to which the war has made the city a focal point of industrial activity. Today it is an important embarkation port (p. 88), is the center of a sizable shipbuilding industry, is in the process of getting into production on aircraft and is going ahead by leaps and bounds in magnesium, oil, synthetic rubber and plywood.

Civic leaders in the Crescent City hope that by intelligent planning they can retain a large portion of the new facilities after the war has ended. They are pointing their efforts toward making New Orleans a principal gateway to South and Central American commerce. Andrew Jackson Higgins, who is to New Orleans what Henry J. Kaiser is to the West Coast, has been building Eureka boats for the United States and some of the Allied nations, but he envisions the use of these shallow-draft craft in opening up the jungles of the Amazon. His plans for aircraft are equally spectacular, being centered around cargo carriers and helicopters.

New Orleans unquestionably has become the hub of a new and important group of wartime industries. It will be interesting to see how its ambitious plans for peacetime pan out.

• • •

TOO LITTLE, TOO LATE? This nation has done a good job in producing munitions but a poor job in producing food. The farm implements the farmer needs to plow, plant, till and harvest are just as important to the production of food as machine tools are to the production of munitions. That is one reason why proper attention to the farm machinery requirements for 1944 (p. 67) rates high among the domestic problems confronting Washington today.

E. L. Shaner

EDITOR-IN-CHIEF

"Swarf" Is Valuable Stuff

"Swarf" is the word used in England for all the metal cut away by machinists' tools—turnings, chips, shavings, etc. There, as in America, "swarf" is valuable because it may contain critical alloys—alloys that cannot be replaced unless reclaimed, and they cannot be reclaimed if "swarf" from various types of steel is mixed. Review your methods of segregation today. See that blueprints are clearly marked for the type of steel to be used. Check your system of "swarf" identification, from machine to truck or railroad car. Establish effective, but simple, markings for machines, tote boxes, chip buggies, V-dump trailers, and salvage bins. Provide adequate supervision to prevent carelessness, and mistakes by new employees.

"Swarf" is valuable stuff. When carefully segregated, it assures more production tools—assures more airplanes, guns, armor for the protection of our fighting men.

ARMY E NAVY

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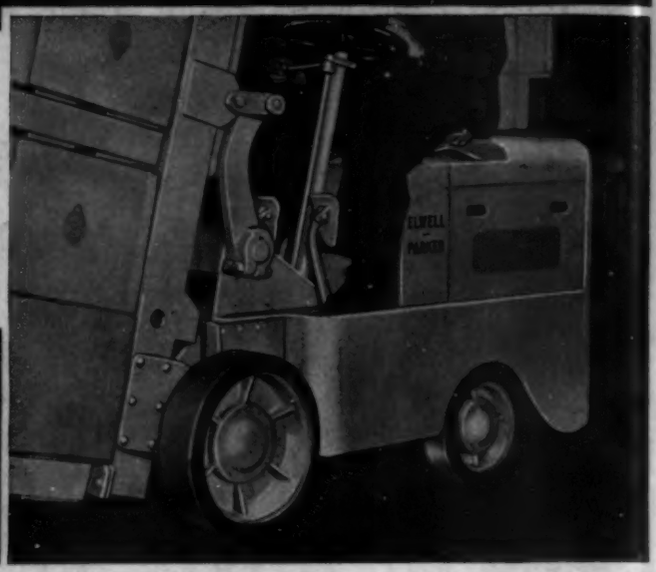
You're Running on Your "Spares"

To maintain full-time operation of your Power Industrial Trucks, you must get *More Months from Your Present Tires*—



Keep an Eye on Your Floors!

1,000,000 more tons of Steel in 1943—not 1944 when synthetic rubber will be available.

Present indications are there will not be enough latex rubber Tires for Power Industrial Trucks. Meantime, Industrial Truck Engineers are collaborating with Rubber Company Engineers in conducting exhaustive tests on Tires made of new compounds.

You *have* to have Trucks to get war contracts out on schedule. So take good care of the Tires you are using today—they probably are your "spares" for the present.

To prolong the usefulness of your present Tires, Elwell-Parker urges you to instruct your men or women Truck Operators to follow strictly these vitally important principles. Thus you will conserve critical rubber while getting your war job done.

These rules are for your Truck Operators to heed:

Avoid broken glass, metal chips
You can gouge out chunks of rubber, ruin Tires in mere days. Look ahead of you. Keep floor clear of sharp trash. Good housekeeping pays.

Stay off the curb
Short cuts save no time. Running Tires over any obstruction not only chews up rubber but tears Tires off rims and damages the Truck.

Keep out of "chock-holes"
Avoid depressions or cracks in floor or pavement. You not only destroy Tires but soon wreck the Truck.

Don't drive through oil
Grease attacks and rapidly destroys rubber. Never drive over patches of oil or accumulated grease. Clean Tires periodically.

Truck is no battering ram. Don't try to start loads by hauling off and giving a smack—you can ruin the Truck mechanism beside tearing miles off Tires by spinning the wheels.

Wouldn't you like to place reprints of this advertisement into your Truck Operators' hands? We will be glad to send them. If interested in training women to drive your Trucks, ask for new Elwell-Parker Instruction Manual "Lady, will you give a Lift?"

The Elwell-Parker Electric Company, 4501 St. Clair Avenue, Cleveland 14, Ohio

ELWELL-PARKER

POWER INDUSTRIAL TRUCKS AND CRANES

1893 ★ 1943 - The Elwell-Parker Year ★ 1943

Implement Prospects

BEST SINCE ADVENT OF WAR

New program commensurate with nation's food goal. . . . Controlled Materials Plan assures logical allocation of steel and other essential metals. . . Fear continues that adequate metals will not be provided

By ERLE F. ROSS
Associate Editor, Steel

FOR the year beginning July 1, manufacturers of farm machinery and equipment theoretically face the best prospects since the advent of war, although there is serious question whether these prospects can be fulfilled.

Following a year and a half of enforced curtailment of operations through government adoption of a short-sighted food production program, and inability to obtain adequate steel and other vital materials to meet even the meager schedules which were allowed, farm equipment industry is heartened by the considerably expanded program announced in the second week in June.

Not only is the new program more nearly commensurate with the nation's food production goal, but it has the aspect of being more practical and workable.

Probably the element contributing most in its favor is that the Controlled Materials Plan is now in full operation and when steel and other essential metals are allotted to a definite use, there should be some degree of assurance, at least, that these will be available and on an established schedule.

However, some of the optimism which the equipment industry expressed upon announcement of the expanded program has faded, and fear is growing that in spite of CMP adequate steel will not be available to make the new schedules possible of full attainment. Setting up production schedules and providing steel to meet them are two different and independent matters. WPB merely authorized higher production schedules and stated that farm machinery makers will be allowed to use stipulated quantities of steel. It did not issue directives for this steel, but is leaving it up to individual manufacturers to obtain their own requirements. The farm machinery program now ranks alongside of other essential war needs, but it seems obvious that it will suffer if insufficient steel is available to meet Army, Navy and Maritime Commission requirements.

In the first place, the new equipment program was announced too late for manufacturers to plan for and place steel orders in any size for third quarter. CMP orders must be validated and given allotment numbers, and this takes time. In the second place, mills are already booked solidly for third quarter and they are filling rapidly for fourth quarter, thus are not in a favorable position to accept farm equipment industry orders for prompt delivery. Consequently, except for those manufacturers which had been able to anticipate future needs closely and place tentative orders subject to later validation, the expanded farm equipment program was principally a nice sounding gesture for the present.

Even under CMP, there is a feeling that WPB's Steel Requirements Committee has assigned more allocations for steel

Move to provide additional machinery and equipment to the hard pressed farmer serves to encourage the hope that the nation's food production problem will be eased over coming months. Typical farm scene shown at top. Below tractor drivers furrow the land in curving contours

Farmall-A tractor, shown above, is pulling a one-row middle buster, an implement widely used in the South and Southwest. The tractor will cover 11 acres a day in middle busting operations

in third quarter than can be produced in that period. How much in excess is not known, but WPB recently announced that output in third quarter would fall 1,000,000 short of requirements, and this was before the coal strike interfered with operations.

Typical of difficulty which equipment makers are experiencing in acquiring steel is that of a manufacturer whose production quota is 80 per cent of his 1940 output. In spite of his quota, his CMP applications were validated to allow him only 90 per cent of his requirements for the quarter beginning July 1; 60 per cent for the quarter beginning Oct. 1; 80 per cent for the quarter beginning Jan. 1, 1944; and 100 per cent for the quarter beginning April 1, 1944. This will give him an average of 82.5 per cent of his requirements for the year, or 66 per cent of his 1940 output.

During recent months, warehouse steel stocks have improved measurably through WPB directive orders, and today some distributors are actually soliciting business for certain products. Among these are hot and cold-rolled sheets, which are extremely tight at mills. Implement makers, who use these products, are finding supplies available from warehouses but at the warehouse differential over mills. To these manufacturers, unable to get sheets from mills, this situation is irksome.

In the new farm machinery program for the year beginning July 1, a total of 900,000 tons of carbon steel has been allocated by WPB to provide operations approximating 80 per cent of 1940. This compares with 40 per cent in effect in second quarter of this year and 20 per cent in first quarter, and neither had been attained because under the priorities system steel could not be obtained by equipment manufacturers. Of this 900,000 tons of steel, 300,000 tons is to be made available in third quarter and advance authorization has been approved for 200,000 tons in each of the three quarters Oct. 1, 1943, Jan. 1, 1944, and April 1, 1944.

In connection with these allocations, WPB issued a new Limitation Order L-257, effective July 1, to replace L-170 in effect Oct. 21, 1942. Under the new order, a farm equipment builder is permitted to make any item for domestic sale up to percentages indicated for that item in Schedule A. The production quotas of specified items are worked out on the basis of the advance authorization of 900,000 tons of carbon steel for the period July 1 to June 30, 1944.

Flexibility in Planning

Most significant, L-257 brackets a large number of items in the schedule to allow manufacturers maximum flexibility on planning their production. Thus, to assure adequate production, distribution, maintenance and repair facilities, the order eliminates the concentration features of L-170. This means that the large producers whose sales are over $10,000,000 in value, are permitted to come back into farm equipment production.

Efforts to concentrate production for 1943 in the smaller plants turned out to be a painful failure. In ordering concentration, WPB had overlooked the fact that the smaller factories lacked national distribution facilities.

Elimination of the concentration features of L-170 likely will mean the larger producers will re-enter the field and that their distribution facilities will be utilized again. The industry has plenty of plant

TD-6 TracTracTor of the International Harvester Co., shown below, will double disk 10 feet or do other work in proportion. Lighter loads are handled as efficiently as heavier loads

capacity because many of its large munitions orders are being made in new or reorganized plants. Furthermore, most of the industry companies are having their war contracts canceled or significantly scaled down.

With new steel and other materials to start arriving July 1, the question arises as to whether this will provide farm machinery for 1943 crops. From 60 to 120 days are required to turn steel and other materials into finished machines and get them where the government directs manufacturers to send them. Some of the equipment will be in the farm territories by Sept. 1.

There is no chance that this new steel could be turned into machinery in time to be used in raising and cultivating this year's crop, but increased production of repair parts will begin in July, and in this category the new materials will be helpful this year.

Although farmers generally, as well as implement makers were heartened by the increased machinery production program, agricultural groups fear that the decision came too late to be of appreciable help to this year's production.

Present, Past and Pending

■ NEW MACHINE TO SAVE LARGE STEEL TONNAGE

PITTSBURGH—Pittsburgh Steel Co. is installing a new machine for upsetting railroad car axles from steel tubing which is expected to save 100,000 tons of steel a year. Machine was built by R. D. Wood Co., Philadelphia.

* * *

■ NEW LOCK IS OPENED AT SOO

DULUTH—One more link in the vital Great Lakes waterway system was provided when on July 11 United States Army engineers opened the new MacArthur lock at the Sault Ste. Marie passage.

* * *

■ LONG-RANGE DEVELOPMENT PROGRAM PUSHED

NEW YORK—International Minerals & Chemical Corp. is assembling a large staff of scientists and building new laboratories at several of its mines and plants to undertake a long range program that will help to develop the company in the future as well as increasing its ability to speed war production.

* * *

■ WESTINGHOUSE CO-ORDINATES ELECTRONICS ACTIVITIES

EAST PITTSBURGH, PA.—Because of the increasing importance of electronics to the war and its promise of even greater industrial achievements in the future, Westinghouse Electric & Mfg. Co. has co-ordinated all its electronic activities under a group of engineer specialists.

* * *

■ PROPOSES HELICOPTER-PLANE FREIGHT SERVICE

CHICAGO—Burlington Transportation Co. has applied to the Civil Aeronautics Board for authority to operate helicopter-type aircraft in freight service over 3000-mile route in Illinois, Iowa, Nebraska, Colorado, Wyoming and Missouri. The company also seeks authority to operate helicopter-type passenger service over a 6380-mile route in 12 western states.

* * *

■ WILL BUILD TRANSPORT PLANE IN MISSOURI

NEW YORK—Curtiss-Wright plans quantity production of its large twin-engined airliner type transport plane in a Missouri plant. Plane already is being built in company's New York plants. The plane has a wingspan of 108 feet, weighs about 50,000 pounds loaded, and is powered with two 2000-horsepower engines.

* * *

■ ALLOW STEEL FOR ONE LICENSE PLATE PER CAR

WASHINGTON—States are permitted to use sheet or strip steel on hand, not heavier than 22 gage and listed as idle or excess inventory, to manufacture one 1944 license plate per motor vehicle under the terms of a new War Production Board order. Limiting license plates to one per car will effect a saving of 12,500 tons of steel. Prewar annual requirements were about 20,000 tons.

* * *

■ ROLLBACK IN TUBULAR GOODS CONSIDERED

WASHINGTON—The rollback of tubular goods prices is definitely being considered, according to OPA sources, but has not "jelled" as yet. No early action is anticipated.

* * *

■ NO RADICAL CHANGES IN BROADCASTING SEEN

SCHENECTADY, N. Y.—While war developments are expected to bring improvements in broadcast transmitters, General Electric Co. engineers see no radical changes that will prematurely obsolete present equipment. In the field of postwar broadcasting replacement by FM stations of many low-powered AM stations is anticipated.

Senate Bloc Suggested To "Decentralize" Steel

Formation of a new Senate bloc to promote "decentralization of iron and steel production" was reported proposed last week by Senator Pat McCarran, Democrat, of Nevada, in letters to 55 senators.

According to an Associated Press report, objectives of the group would be to foster new and expanded facilities for production of iron and steel in areas outside the few acknowledged steel centers which, according to Senator McCarran, now account for about 90 per cent of the nation's iron and steel output.

Mines Bureau Gets Funds To Advance Minerals Program

Exploratory and development work of the Bureau of Mines looking toward expansion of local resources of steelmaking materials was given additional stimulus last week with announcement of a $2,000,000 appropriation for this purpose.

Projects directly benefited include iron ore, coal, coke, fluorspar and related materials. Also included were the bureau's pilot plant and laboratory programs.

Other funds allocated to the Bureau of Mines are for the following purposes:

To explore bauxite and alunite clays, $1,860,000; for manganese exploration and laboratory work, $900,000; for magnesium development, $225,000; for sponge iron, $400,000; for investigation of critical and essential minerals deposits, $3,900,000; for developing methods of producing alumina from low-grade bauxite and clays, $490,000.

These funds have been made available to the bureau in addition to the regular and continuing appropriations for safety work, etc. Officials hope to reach an early decision on projects which are to receive the additional money.

Armed Forces, Munitions Industries Need 3,600,000 More in Next Year

Civilian employment to be reduced by 2,300,000. . . Labor force must be raised 1,300,000. . . Transfers from area to area necessary. . . Agriculture and unemployed now at minimum

TO THE armed services and the munitions industries between now and July 1, 1944, must be added a total of 3,600,000 persons, according to the latest prognostications of the War Manpower Commission. This must be accomplished despite the greatest stringency in the manpower market yet faced by this country.

With slight or no reserve of unemployed on which to draw, the task must be accomplished by transfers from industry into the armed services, from industry to more essential industry, and from less critical to more critical areas.

Even in the critical areas and industries, young men will be withdrawn for the armed services; replacements by older workers or women will be necessary for inductees.

Employment in nonessential industries will be contracted further. This declining civilian employment will yield workers to meet new demands only if such workers, who for the most part are not in critical labor markets, can be transferred physically to the localities where they are needed.

Recruitment of additional women not now in the labor force will be more difficult in the coming year in view of the fact that those most able to accept employment already have been recruited.

"Intensive recruitment measures are necessary to assure full utilization of women, negroes and other available labor reserves in the shortage areas," according to the WMC.

"While transfers of workers from area to area should be made only after full utilization of local reserves, such transfers will be required in many areas. In such cases, every effort should be made to transfer as much production as possible out of areas to which it is necessary to transfer workers. The stringency of the present manpower situation requires that these objectives be obtained with a minimum of disruption in employment and production. Positive measures are required to reduce undesirable migration to channel hiring, to train workers, and to improve utilization of the present labor force."

Total manpower requirements a year from now are estimated at 65,900,000, compared with present requirements of 64,600,000, an increase of 1,300,000. This includes an increase of 2,000,000 in the armed services (exclusive of replacements), 1,600,000 more in munitions industries, and a decrease of 2,300,000 in other nonagricultural industries. No change is expected in agriculture nor in the unemployed.

Net effect of such change is shown in the following table:

	July, 1943	July, 1944 (In millions)	Increase or Decrease
Armed forces	9.3	11.3	+2.0
Munitions industries	10.0	11.6	+1.6
Other nonagricultural industries	32.3	30.0	—2.3
Agriculture	12.0	12.0	0
Total employed and armed forces	63.6	64.9	+1.3
Unemployed	1.0	1.0	0
Total manpower requirements	64.6	65.9	+1.3

ALL-WOMAN PLANT

Northern Aircraft Products Division of the Aviation Corp. at Toledo, O., is the first plant of its kind in the country to be staffed entirely by women on production operations. Precision aircraft engine parts and propellers are made at the plant.

During the next four months when the production force is brought up to maximum, only women will be hired for production work, according to William F. Wise, executive vice president. Men are employed at the plant as job setters, supervisors and instructors.

More Cargo Ships Built in 6 Months Of 1943 Than in All of Last Year

MORE cargo ships were built in the nation's shipyards in the first six months of 1943 than in all of 1942, figures released by the Maritime Commission last week show.

In June the shipyards of the nation delivered 168 cargo vessels bringing total production for the first half of the year to 879 ships aggregating 8,818,622 deadweight tons. In the entire year 1942 the yards produced 746 vessels totaling 8,089,732 deadweight tons.

The June output of 168 vessels aggregating 1,676,500 deadweight tons compared with the record total of 175 for May (31 days), and 157 in April.

June construction brought a new record for ships delivered by an individual yard. The California Shipbuilding Corp. sent 20 Liberty ships into service compared with 18 delivered in May and 19 in April. The Shipbuilding Division of the Permanente Metals Corp. turned in a total of 25 Liberties; these were built in the former Richmond Yards No. 1 and 2 which until recently were run as separate yards. In the future they will be run as one.

Other high totals turned in included 14 Liberty ships by Bethlehem-Fairfield Shipyard, Baltimore, and 17 Liberties by the Oregon Shipbuilding Corp., Portland, Oreg.

The total of 168 vessels included 115 Liberty ships, 19 C-type cargo ships, nine coastal cargo vessels, 11 M. C. tankers, three coastal tankers, three special types, six sea-going tugs, and two ore carriers.

The West Coast region produced 82 ships totaling 870,800 deadweight tons, or 51.94 per cent of the national total. The East Coast built 30.39 per cent of the tonnage, or 509,300 deadweight tons represented by 45 vessels. On the Gulf Coast 25 ships with combined deadweight tonnage of 237,800 were delivered, accounting for 14.48 per cent of the grand total. The remaining 3.49 per cent of the tonnage was delivered from Great Lakes region yards which built 16 ships.

May Production Fails To Gain

Leveling off largely caused by changes in military program, due to experience in battles. . . WPB officials warn second half production must exceed first six months by 50 per cent

SHIFTS in military program necessitated by battlefront experience held May munitions production to the April level. War Production Board's index was 563 (based on November, 1941, as 100), the same as the revised April figure.

This was "not a discouraging sign", according to WPB Chairman Donald M. Nelson, who said preliminary estimates indicated June production was slightly better.

At the same time, WPB officials warned that the country will have to produce 50 per cent more war goods in the second half of this year than in the first half. This estimate was substantiated by a report on the progress of the four major programs. Of the four, merchant ships are the farthest advanced with 44 per cent of the year's objective completed by June 30. Army ordnance and output of naval vessels were estimated to be 40 per cent complete while the year's aircraft program is 35 per cent complete.

Munitions now are being produced at a rate of $60,000,000,000 a year and the total for the 12-month period is expected to run beyond $65,000,000,000.

Aircraft and related munitions and equipment produced in May showed an increase of 5 per cent over April, on a dollar basis, and 10 per cent on airframe weight basis. Trend continued toward production of heavier planes.

Production of Army and Navy vessels, and Navy ordnance and equipment gained 2 per cent. Completion of naval vessels represented 204,000 displacement tons, an increase of 30 per cent over April, and 9 per cent over the best previous monthly achievement. Marked progress is being made in delivery of destroyer escort vessels.

Ground ordnance declined 3 per cent.

Merchant vessels, measured in value of work put in place, declined 4 per cent. Deliveries, however, were up to 1,771,000 deadweight tons, an increase of 179,000 tons over April. Tanker production reached a new high as result of deliveries not scheduled until June. Output of minor types was increased by delivery of four ore carriers and amounted to 110,000 tons, compared with 37,000 tons in April.

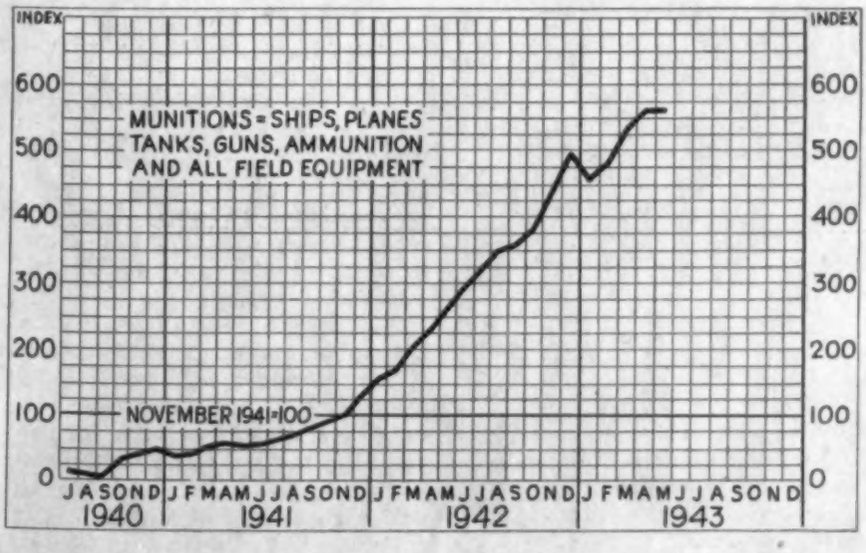
Production of miscellaneous munitions declined 7 per cent in the month. Military automotive vehicle output rose 3 per cent, but was offset by a falling off in clothing and other equipment and supplies.

Tool Backlogs Shrink As May Bookings Decline

Machine tool builders continued to eat into their unfilled order backlog in May at a rapid rate as indicated by figures just revealed by the War Production Board. May bookings at $48,091,000 were the smallest since WPB first began recording statistics beginning with 1942. April orders totaled $57,359,000 and for May, 1942 were $166,945,000.

May shipments continued at close to the high rate of the last few months at $113,710,000, comparing with $118,031,000 for April and $103,364,000 for May, 1942.

Unfilled machine tool orders at the end of April were $643,643,000 and the indicated figure for May 31 was $578,000,000. This is the smallest backlog since the end of July, 1941 when the industry had orders amounting to $572,000,000. An all-time peak of $1,389,363,000 was established June 30, 1942.


INDEX
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Steel Payrolls Reach New Peak During May

Steel industry payrolls reached a new high mark in May when $137,404,000 were distributed to the industry's employes, according to the American Iron and Steel Institute.

Total for May was more than $500,000 higher than the previous peak of $136,813,000 paid out in March, and is substantially above the total of $117,403,000 paid out in May, 1942. In April this year, a shorter month, steel payrolls totaled $133,275,000.

Hourly earnings of wage-earning steel employes likewise set a new record in May, averaging 113.4 cents per hour, compared with the previous peak of 111.2 cents per hour in April of this year. In May a year ago, steel employe earnings averaged 101.1 cents per hour.

During May, the total number of employes on the industry's payrolls averaged 632,000, as against 634,000 in April and 656,000 in May of last year.

Wage earners worked an average of 41.9 hours per week in May, compared with 42.5 hours per week in April and 37.7 hours per week in May, 1942.

House Group Votes To Let Guffey Act Expire

Members of the House Ways and Means Committee who last week rejected extension of the Guffey Coal act contended that since the government had taken over the coal mines as an aftermath of strikes, the act was no longer necessary, that it had failed to stabilize the industry and that it had resulted in higher prices for coal consumers.

Enacted in 1937 to put a floor under prices at the mine and thereby to prevent unregulated competition in an industry long involved in serious price competition, the Guffey Act will expire Aug. 23 unless President Roosevelt, the mine operators, unions and other proponents are successful in their campaign for its reinstatement.

H. L. Findlay, Ohio coal operator, testified that failure to continue the act would result in a severe shortage of coal.

"SHARE THE STEEL" Drive Reported Off to Good Start

IRVING S. OLDS

BENJAMIN F. FAIRLESS

Government aggressively pushing effort to obtain 2,000,000 additional tons in last half of year. . . Industry executives think chief hope for success rests in bringing in of new capacity

ALTHOUGH considerable skepticism is expressed in some quarters with respect to the possibilities for success of the government's effort to obtain 2,000,000 additional tons of steel in the last half of the year, the War Production Board's Steel Division reports encouraging progress in the first week of the drive.

Approximately an additional 75,000 tons of steel have been made available for war production as the result of the first few days operation of the "Share the Steel" campaign, it was announced last week by John T. Whiting, new director of the Steel Division.

The "Share the Steel" campaign involves the discussion of inventories with more than 2000 manufacturers to see if stocks on hand permit the cancellation or deferment of third and fourth quarter orders on producers' books without interfering with authorized programs.

To carry his personal plea for uninterrupted production to the steelworkers, WPB Chairman Donald M. Nelson paid a visit to the Homestead works of Carnegie-Illinois Steel Corp. Shown bending over and peering into a furnace are, left to right: C. E. Wilson, WPB executive vice chairman; CIO President Philip Murray; and Mr. Nelson. Acme photo

As of July 3, with only several score consumers visited, the following results have been obtained, the tonnage figures representing either cancellations of existing orders on mills, or cancellations of allotments authorized by a claimant agency, but not yet placed on mills: Atlanta region, 14,000 tons; Chicago region, 5000 tons; Philadelphia region, 27,000 tons; Cleveland region, 13,200 tons; Dallas region, 17,000 tons.

"We have got off to an excellent start in this drive," Mr. Whiting said, "and with the continued co-operation which we have been getting, I know that the country is going to have available a large tonnage of steel for important war production which will go far in meeting the over-all goal of 2,000,000 tons of additional steel in the third and fourth quarters."

Whatever success is met in the government-sponsored drive there is little question prospects are not too encouraging, some industry officials believe.

For one thing, the drive was launched under inauspicious circumstances considering the fact a substantial tonnage has been lost from current production through the closing down of blast furnaces and open hearths as a result of the coal mine suspensions.

At a press conference recently in Cleveland, Irving S. Olds, chairman, and Benjamin F. Fairless, president, United States Steel Corp., said it was their opinion the chief hope for obtaining additional tonnage rests in the ability of the government to hurry along the steel expansion program.

Mr. Fairless said the steel drive, launched at a meeting in Pittsburgh July 1, was a three-pronged effort involving redistribution of supplies wherever possible, increasing of production from existing facilities, and enlargement of output through the bringing in of plants now in process of construction.

He said that in the case of his own

corporation alone the steel tonnage lost in one week as a result of the coal strike totaled 35,000 to 45,000 tons of ingots. This was in addition to tonnage lost in previous weeks due to suspension of mining operations.

He declined to estimate the total industry loss of steel as a result of the coal strike but in other quarters it was believed to have run as high as 150,000 tons per week.

At the moment the situation with respect to coal mining and steel production is greatly improved. Conditions have brightened considerably with the steady return of miners to the pits, in fact so much so, that at least seven of the eighteen blast furnaces which had been made idle resumed blowing last week. Prospects are good that additional stacks will go into blast within the next few days.

Conference Held in Cleveland

The newsmen's conference with the steel officials followed the showing of the corporation's latest motion picture "To Each Other" to some six hundred businessmen and industrialists at Hotel Cleveland.

Both Mr. Olds and Mr. Fairless were confident that ore supplies would be adequate for this year's steel production needs despite the late opening of the lake shipping season and the fact that ore shipments to date this year are about 27 per cent behind the movement in the corresponding period of last year.

It was believed shipments the remainder of the season, providing the season is not shortened by weather, will permit the lake carriers to make up the deficit.

The ore shipment goal this year was set at 90,000,000 tons, and to July 1 the total movement from the upper lakes amounted to 24,793,890 tons compared with 33,952,166 in the like period last year.

Mr. Fairless said that there are no particular worries about iron ore for the current year, but said it was possible that should the season be cut short some difficulty might be encountered next spring.

Backing up this view, A. H. Ferbert, president, Pittsburgh Steamship Co., United States Steel lake shipping subsidiary, said that the Pittsburgh fleet in the week ended July 3 brought down the largest weekly tonnage of iron ore in lake shipping history, a total of 1,400,000 tons. The Pittsburgh Steamship fleet handles about 40 per cent of the iron ore shipped down the Great Lakes.

Answering a question with respect to the repeated reports of rapidly decreasing supplies of high-grade iron ore in the Lake Superior district, Chairman Olds said there will be plenty of economically usable ore on the Lake Superior ranges in the lifetime of "all those present in the room."

He admitted that the supply of high-grade ore is diminishing under the heavy demands of the war production effort, but said that plans are being made to utilize the lower-grade ores, pointing out that the United States Steel Corp. for the past seven or eight years has been developing in a laboratory in New Jersey a process designed to promote economical use of low grade ores.

Commenting on postwar conditions, the steel corporation executives expressed no fear of competition from the light metals.

"We are not worrying about competition from light metals and plastics when the war ends," said Mr. Fairless. "Creating facilities does not create a market. We've had aluminum a long time. Just because more aluminum plants have been built does not mean aluminum will be a greater competitor of steel and we don't think it will."

With respect to scrap, Mr. Fairless said that up until the time of the coal strike scrap supplies were very comfortable but that the coal strike had changed the picture very radically.

Chicago Consumers Asked To Draw on Inventories

Steel consumers in the Chicago district were asked on July 2 to "share the steel" by drawing upon their inventories to the lowest practical working level before asking mills to supply them with more steel. The campaign was initiated by WPB officials at a luncheon meeting at the LaSalle hotel.

The Chicago district, including five counties in Illinois and five in Indiana, is being asked to provide 290,000 tons of steel.

Charles Halcomb, WPB Steel Division, stated steel producers had accumulated backlogs of orders of from 8 to 15 months.

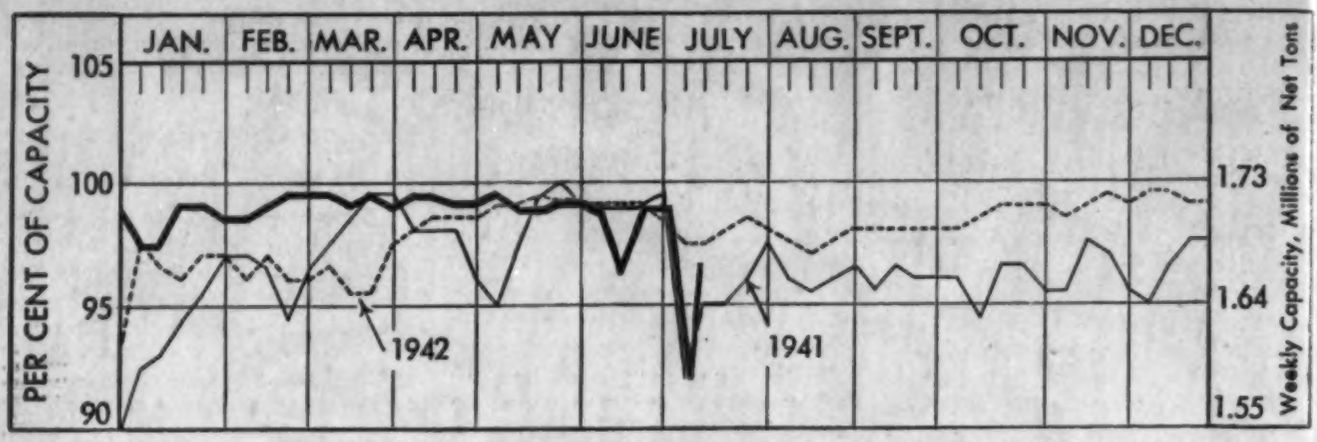
A 7,000,000 ton shortage threatens, according to Mr. Halcomb, with 23,500,000 tons of carbon and alloy steel having been asked for.

STEEL INGOT STATISTICS

	Estimated Production—All Companies								Calculated weekly production, all companies Net tons	Number of weeks in mo.
	—Open Hearth—		—Bessemer—		—Electric—		—Total—			
	Net tons	Per cent of capac.	Net tons	Per cent of capac.	Net tons	Per cent of capac.	Net tons	Per cent of capac.		
Based on Reports by Companies which in 1942 made 98.3% of the Open Hearth, 100% of the Bessemer and 87.6% of the Electric Ingot and Steel for Castings Production										
1943										
Jan.	6,576,589	97.8	478,058	85.9	369,395	95.4	7,424,042	96.8	1,675,856	4.43
Feb.	6,033,674	99.3	447,843	89.1	344,532	98.6	6,826,049	98.5	1,706,512	4.00
March	6,785,295	100.9	503,673	90.5	381,219	98.5	7,670,187	100.0	1,731,419	4.43
1st qtr	19,395,558	99.3	1,429,574	88.4	1,095,146	97.5	21,920,278	98.4	1,704,532	12.86
April	6,509,812	99.9	481,810	89.4	382,532	102.1	7,374,154	99.3	1,718,917	4.29
May	6,664,298	99.1	483,024	86.8	398,057	102.9	7,545,379	98.4	1,703,246	4.43
June	6,188,857	95.0	453,399	84.1	384,645	102.6	7,027,101	94.6	1,638,019	4.29
2nd qtr	19,362,967	98.0	1,418,433	86.7	1,165,234	102.5	21,946,634	97.4	1,686,905	13.01
1st hlf	38,758,525	98.7	2,848,007	87.6	2,260,380	100.0	43,866,912	97.9	1,695,667	25.87
Based on Reports by Companies which in 1942 made 98.3% of the Open Hearth, 100% of the Bessemer and 87.6% of the Electric Ingot and Steel for Castings Production										
1942										
Jan.	6,322,215	95.3	490,874	86.0	299,017	94.2	7,112,106	94.5	1,605,442	4.43
Feb.	5,785,918	96.6	453,549	88.0	273,068	95.2	6,512,535	95.9	1,628,134	4.00
March	6,572,930	99.0	493,191	86.4	325,990	102.7	7,392,111	98.2	1,668,648	4.43
1st qtr	18,681,063	97.0	1,437,614	86.7	898,075	97.4	21,016,752	96.2	1,634,273	12.86
April	6,345,133	98.7	454,834	82.2	321,324	104.5	7,121,291	97.7	1,659,975	4.29
May	6,595,440	99.4	438,938	79.5	333,200	104.9	7,382,578	98.1	1,666,496	4.43
June	6,239,674	97.1	452,528	81.8	323,100	105.1	7,015,302	96.3	1,635,269	4.29
2nd qtr	19,180,247	98.4	1,361,300	81.2	977,624	104.8	21,519,171	97.4	1,654,049	13.01
1st hlf	37,861,310	97.7	2,798,914	83.9	1,875,699	101.1	42,535,923	96.8	1,644,218	25.87
July	6,345,315	95.7	453,686	79.6	345,957	96.6	7,144,958	94.5	1,616,506	4.42
Aug.	6,414,637	96.5	467,293	81.8	345,725	96.3	7,227,655	95.4	1,631,525	4.43
Sept.	6,286,855	97.9	437,961	79.4	332,703	95.9	7,057,519	96.4	1,648,953	4.28
3rd qtr	19,046,807	96.7	1,358,940	80.3	1,024,385	96.3	21,430,132	95.4	1,632,150	13.13
9 mos.	56,908,117	97.3	4,157,854	82.7	2,900,084	99.4	63,966,055	96.3	1,640,155	39.00
Oct.	6,750,829	101.5	461,897	80.9	366,788	102.2	7,579,514	100.0	1,710,951	4.43
Nov.	6,371,750	99.0	458,469	82.9	349,593	100.5	7,179,812	97.8	1,673,616	4.29
Dec.	6,471,261	97.6	475,204	83.4	358,075	100.0	7,304,540	96.6	1,652,611	4.42
4th qtr	19,593,840	99.4	1,395,570	82.4	1,074,456	100.9	22,063,866	98.2	1,679,137	13.14
2nd hlf	38,640,647	98.0	2,754,510	81.3	2,098,841	98.6	43,493,998	96.8	1,655,653	26.27
Total	76,501,957	97.9	5,553,424	82.6	3,974,540	99.8	86,029,921	96.8	1,649,979	52.14

The percentages of capacity operated in the first 6 months of 1942 are calculated on weekly capacities of 1,498,029 net tons open hearth, 128,911 net tons Bessemer and 71,682 net tons electric ingots and steel for castings, total 1,698,622 net tons; based on annual capacities as of Jan. 1, 1942, as follows: Open hearth 78,107,260 net tons, Bessemer 6,721,400 net tons, electric 3,737,510 net tons. Beginning July 1, 1942, the percentages of capacity operated are calculated on weekly capacities of 1,500,714 net tons open hearth, 128,911 net tons Bessemer and 81,049 net tons electric ingots and steel for castings, total 1,710,674 net tons; based on annual capacities as follows: Open hearth 78,247,230 net tons, Bessemer 6,721,400 net tons, Electric 4,225,890 net tons.

The percentages of capacity operated in 1943 are calculated on weekly capacities of 1,518,621 net tons open hearth, 125,681 net tons Bessemer and 87,360 net tons electric ingots and steel for castings, total 1,731,662 net tons; based on annual capacities as of January 1, 1943 as follows: Open hearth 79,180,880 net tons, Bessemer 6,563,000 net tons, electric 4,554,980 net tons.



STEEL INGOT PRODUCTION BY MONTHS

Net Tons, 000 omitted

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1943	7,424	6,826	7,670	7,374	7,545	....	....	....	....	....	....	....
1942	7,112	6,512	7,392	7,122	7,382	7,022	7,148	7,233	7,067	7,584	7,184	7,303
1941	6,922	6,230	7,124	6,754	7,044	6,792	6,812	6,997	6,811	7,236	6,960	7,150
PIG IRON PRODUCTION												
1943	5,194	4,766	5,314	5,035	5,178	....	....	....	....	....	....	....
1942	4,983	4,300	5,055	4,896	5,073	4,935	5,051	5,009	4,937	5,236	5,083	5,201
1941	4,666	4,206	4,702	4,340	4,596	4,551	4,766	4,784	4,721	4,860	4,707	5,014

First Half Record

43,866,912 tons of steel produced despite effects of stoppages in coal mines

DESPITE drastic cuts in steel production over the past few weeks output for first half established a new record, according to the American Iron and Steel Institute. Total for the first six months was 43,866,912 net tons, compared with 42,535,923 tons in the corresponding 1942 period. Second quarter output also exceeded that of the similar period last year, 21,946,634 tons, compared with 21,519,171 tons.

June production totaled 7,027,101 tons, against 7,545,379 tons in May and 7,015,302 tons in June, 1942. Last month's tonnage was the smallest since June of last year, with the exception of February, when output was 6,826,049 tons.

For first half this year the industry operated at 97.9 per cent of capacity, in June 94.6 per cent. This is the lowest rate of production since July, 1942, when it was at the same rate.

Lend-Lease Redistributing 250,000 Tons of Steel

Redistribution of 250,000 tons of finished and semifinished steel products originally intended for Russia, is being handled by the Lend-Lease Administration through a unit especially established for making war use of materials no longer needed under lend-lease. The steel products became available for other use when Russian war needs changed. War materials other than steel also are involved.

DISTRICT STEEL RATES

Percentage of Ingot Capacity Engaged in Leading Districts

	Week ended July 10	Change	Same week 1942	Same week 1941
Pittsburgh	97	+20.5	95	99.5
Chicago	98.5	None	101.5	100.5
Eastern Pa.	93	None	96	97
Youngstown	94	None	95	98
Wheeling	87	+1	77.5	91
Cleveland	92.5	+2.5	95	96.5
Buffalo	90	—2.5	90.5	93
Birmingham	95	None	95	90
New England	95	+2	92	90
Cincinnati	89	—3	92	88
St. Louis	95	None	95.5	98
Detroit	92	None	89	96
Average	97	+5	*97.5	*95.0

*Computed on bases of steelmaking capacity as of those dates.

Coal Strike Cuts Week's Steel Output 126,400 Tons

Steel castings and ingot output in the week beginning June 28 dropped 126,400 tons under the previous week as a result of the coal strike the Steel Division, War Production Board, reported last week.

Estimated production for the week beginning June 28 was 1,563,700 tons compared with 1,690,100 tons the previous week.

Cut by mine strikes, coal production for the first half of 1943 was an estimated 1,729,000 tons less than for the same period in 1942, Solid Fuels Administrator Harold L. Ickes said in studying its effect on the war effort.

Ingot Rate 97%

Nearly all ground lost previous week regained. All Chicago blast furnaces blowing

PRODUCTION of open-hearth, bessemer and electric furnace ingots last week recovered nearly all the ground lost in the prior period when the coal stoppage cut blast furnace and open hearth operations severely.

The rate rebounded 5 points to 97 per cent of capacity, slightly below the 98½ per cent in the week ending June 26.

Four districts led by Pittsburgh, registered gains, two declined slightly and six were unchanged.

One year ago the rate was 97½ per cent; two years ago it was 95 per cent, both based on capacities as of those dates.

All blast furnaces in the Chicago district are active, Carnegie-Illinois Steel Corp. having lighted its rebuilt Gary No. 7 stack, July 3. Capacity has been enlarged to 1341 tons per day, nearly twice its former rating. This is the first time since June, 1942, all stacks have been blowing.

June Plate Production Lowest Since November

June plate production totaled 1,056,085 tons, lowest since last November, according to the War Production Board. This compares with 1,114,920 tons in May, and an all-time record of 1,167,679 tons reported during March of the year by producers.

Regulation No. 6 Provides Uniform Method To Obtain Building Supplies

Basic allotment procedure similar to that under Regulation No. 1. . . Class B products not covered. . . Does not eliminate necessity of applying for authorization under terms of War Production Board order L-41

CMP REGULATION No. 6 has been issued by the War Production Board, bringing materials for construction and facilities under the Controlled Materials Plan. It provides a uniform method which may be used to obtain materials.

It does not eliminate the necessity for obtaining authorization to construct under terms of order L-41.

For purposes of the regulation, construction includes reconstruction, restoration or remodeling of any structure or project or any extension or alterations of such project. Facilities are machinery or equipment acquired in connection with construction.

Allotment Procedure

Controls over construction materials under CMP regulation No. 6 are similar to those exercised over production materials under CMP regulation No. 1. The basic allotment procedure is similar, although in instances where regional WPB offices authorize small projects purchase authority may be granted for any period necessary rather than for a full quarter.

Claimant agencies will be able to make advance allotments to prime consumers within specified limits. Prime consumers who receive allotments for advance quarters may make allotments to their suppliers for advance quarters. The same holds true in the case of secondary consumers. However, no consumer of controlled materials may make an allotment before he receives his own allotment.

Prime consumers are persons who receive allotments of controlled materials from a claimant agency. In most cases the prime consumer is the person who is to own the structure or project, and not the general contractor. Exceptions are as follows: Where the structure is to be owned by the Army or Navy, the person who contracts with the Army and Navy for the construction is the prime consumer; if the project is a foreign project, the person holding the export license for the materials required is the prime consumer; in the case of projects financed by Defense Plant Corp., the prime consumer is the person designated as such by DPC.

Manufacturers producing Class A products off the site of construction may obtain their materials through the allotment procedures under this regulation but their use of allotments is governed by CMP regulation No. 1. Controlled materials for the manufacture of Class B products are not obtained under CMP regulation No. 6.

Applications for allotments of controlled materials are filed by prime consumers on various forms as listed in Exhibit A attached to the regulation. Most important among these is WPB-617, formerly PD-200. Under no circumstances are persons seeking materials and authorization to construct permitted to file form PD-200, which WPB-617 replaces. In addition, a request for an amendment to an approved application must be submitted on the new WPB-1548 form which supersedes PD-200B.

Consumers of controlled materials in construction may require their suppliers to furnish them with applications for allotments on form CMP-4A, covering the requirements for the products or parts to be supplied. In no case may a consumer include requirements for Class B products in applications for controlled materials needed for construction.

In cases where maintenance or repair work is being performed as part of a construction job for which authorization to begin construction is required under L-41, controlled materials for the maintenance or repair must be included in the prime consumer's application. Materials needed for maintenance or repair of this type may not be obtained under CMP regulations Nos. 5 or 5A, if the cost is in excess of the limits established under L-41, unless specific authorization to do so has been granted by WPB.

However, if maintenance or repair work or a minor capital addition is of a character not requiring specific authorization under L-41, necessary materials may be obtained under CMP regulations Nos. 5 or 5A.

WPB Prescribes Forms

Consumers may make allotments of controlled materials on WPB forms prescribed for that purpose. Suppliers must make allotments of controlled materials in the forms and shapes which have been allotted to them and only in those forms.

The regulation includes an alternative form of allotment under which a prime consumer may make simultaneous direct allotments to all secondary consumers in the production chain, regardless of their remoteness from the prime consumer.

Specific limitations on the use of allotments are spelled out in the regulation as follows:

A consumer may not make an allotment in advance of receiving his own allotment; a consumer may not place orders and allot a greater total of controlled materials than have been allotted to him; allotments under CMP regulation No. 6 may neither be made nor received for the production of Class B products: allotments must be used to get materials for the construction for which the allotment was made or to replenish inventory, within the limits established by CMP regulation No. 2.

Consumers may combine in a single allotment to a supplier the controlled materials requirements for several construction jobs which are identified by the same major program number of a particular claimant agency.

The regulation spells out in detail procedures to be followed where, for any reason, changes in allotments are necessary.

Exemption from the usual allotment

(*Please turn to Page* 172)

JOHN T. WHITING

HEADS STEEL DIVISION:—John T. Whiting, president of Alan Wood Steel Co., Conshohocken, Pa., has been appointed director of the Steel Division, War Production Board, succeeding H. G. Batcheller who recently was named operations vice chairman of WPB. Mr. Whiting had been deputy director of the Steel Division since May 26.

WINDOWS of WASHINGTON

AFL in Ascendancy

IN INFORMED quarters the action of Congress in prohibiting the National Labor Relations Board from invalidating labor union contracts which have been in effect for more than three months marks the beginning of a period with the American Federation of Labor in the ascendancy insofar as treatment of labor by the government is concerned.

According to AFL, the NLRB has been concerned mainly, since it first was organized, with the welfare of the Congress of Industrial Organizations. When the CIO launched its drive to have the AFL contracts with Kaiser shipyards on the West Coast ruled illegal it proved the straw that broke the camel's back. AFL conducted a very effective lobby in its defensive fight, pointed out that its membership was much greater than that of CIO, and claimed that its war record was better.

Another angle that counted with a Congress which is increasingly determined to keep the administration within bounds was the degree to which the administration had encouraged the CIO ever since its formation. Tide has swung to the side of labor leaders regarded as "more conservative."

Widely Read

Dynamics of Industry, published by Harper & Bros. in 1942, is being more widely read by industrialists who are thinking about the postwar economy and who are anxious to contribute toward widespread employment in that period.

Written by two CIO leaders, Clinton S. Golden and H. J. Ruttenberg, the book goes into detail in explaining that the welfare of labor must rest on a prosperous industry.

Swing Toward Sales Tax

Despite AFL, CIO and administration opposition to a federal retail sales tax, observers see in process of development in the House Ways and Means Committee a swing toward legislating such a tax. Members of the committee have figured that a 10 per cent sales tax, to apply to sales of all goods including food, would bring some $5,000,000,000 additional revenue and would help the fight against inflation.

Whether they will act on the Treasury Department's recommendation that income taxes on corporations and on individuals in the medium and high-income groups be increased so as to garner another $3,000,000,000 remains to be seen but a number of the committee members are inclined to feel that income taxes—as well as taxes on gifts and inheritances—are pretty close to the limit. There is decided opposition to the Treasury Department's "spending" tax in which the first $1000 or $1500 of income would be exempted, with a levy of 10 per cent on the next $1000 and with progressively higher taxes on larger income. There appears to be considerable opposition to the suggestion that tax exempt state and municipal securities be made taxable, also to the idea of further big increases in taxes on wines, liquor, tobacco and some other items. Support for a "community property" provision does not appear warm.

PEAK BRITISH OUTPUT

Great Britain's output of iron and steel ingots last year reached a new high mark, despite all difficulties, according to John Brown, general secretary of the Iron and Steel Federation. He was not permitted by war regulations to release the figures.

Mr. Brown also announced that the victory in North Africa has made available extensive supplies of iron ore for shipment to the United Kingdom. Before the war British imports of ore from Algeria and Tunisia amounted to about 2,000,000 tons annually.

Ore Near Pittsburgh

The Bureau of Mines is toying with the idea of having roadbuilding contractors mine iron ore in a deposit some 100 miles East of Pittsburgh. The ore is on the surface and could be scooped up with equipment the contractors have on hand. Optimistic estimates are that some 64,000 tons could be dug per day of which, after washing out the clay in wooden washers, about 16,000 tons would be iron ore of satisfactory quality.

This proposition is one of many the Bureau of Mines has on its agenda but which it has been unable to investigate fully due to the uncertainty over the amount of the appropriation it would get from Congress.

Would Aid Early Start?

Possibilities of holding ore boats at upper lake ports over the 1943-1944 winter are under consideration. Purpose is to load boats and send them down the lakes a few days earlier, when navigation opens in 1944. The difficulty is that facilities and services for laying up boats are at the lower lake ports.

NE Steels Gaining

The Navy Department has made considerable progress in substituting NE (National Emergency) steels for high alloy steels it formerly demanded. It has found that procurement is facilitated by the use of the chromium-nickel-molybdenum types inasmuch as the mills have encountered increasing difficulty in producing the single or binary alloy steels.

Most diesel engine and marine engine parts now are being made of NE steels. Some anchor chain is being made of such material. In Navy Ordnance many torpedo parts and some gun components are being made of NE steels. Many components for Ships, Ordnance, Coast Guard, Marine Corps and other bureaus are now largely made of NE steels.

The greater portion of tonnage in large ship forgings and heavy ordnance, however, will not lend itself to NE steels.

Right now emphasis is on experiments by steel producers and ordnance producers with various analyses that will make it easier for the steel producers to utilize chromium-nickel-molybdenum scrap.

Must Do Something

More and more Republican members of Congress are criticizing the contract renegotiation setup on the ground that no thought is given in renegotiation to set up reserves for reconversion of industry after the war. Unless the law is revised to take care of this angle it is sure to be one of the 1944 campaign issues. It will tie in with the argument that something has to be done now to provide for large employment after the war.

Electronics Magic

Most specialists in the field of electronics are tied in with the war effort and under military censorship are not permitted to discuss in detail what they are doing. Enough information is obtainable, however, to make it certain that wartime progress in this field will have repercussions in many peacetime industries. For instance, smaller and more efficient tubes have been developed; it seems likely therefore, that manufacturers of radio receiving sets will design their future products around the new tubes, also that manufacturers of other types of products using tubes will do the same. Electronics experts also believe that electronic "scanning" will be widely used in numerous industries, with the result that they will produce more efficiently products of better quality and greater uniformity.

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CHECK THESE ADVANTAGES OF BLANCHARD GRINDING

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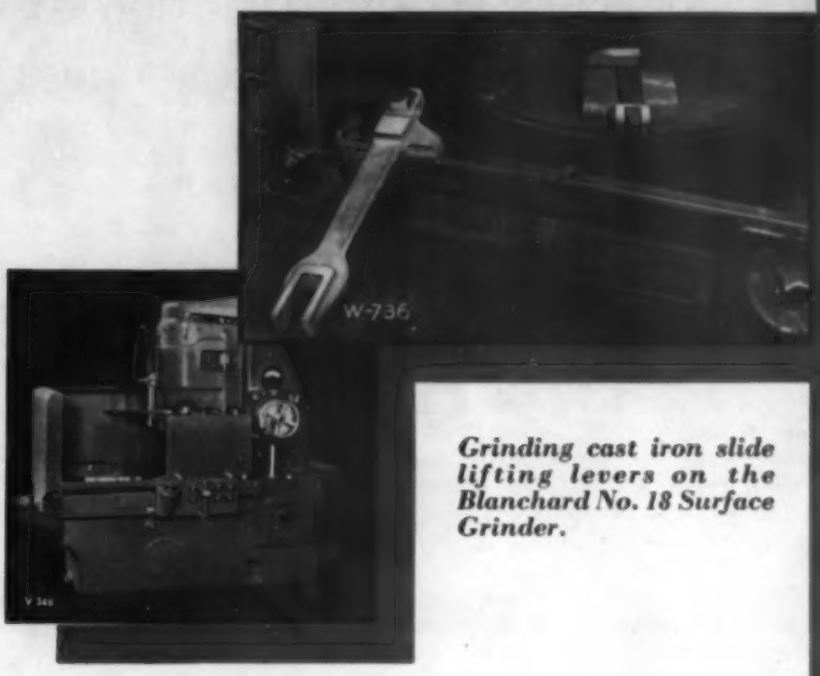
★ . . . . . *Especially valuable on jobs like the one illustrated.*



Grinding cast iron slide lifting levers on the Blanchard No. 18 Surface Grinder.

AT FIRST GLANCE this does not look like a job for the Blanchard No. 18 on account of the projecting boss. The problem was solved simply enough. The lever is laid on the chuck so that the boss goes through the hole in the center of the chuck. The outer surface, which is lower than the inner surface, is ground. The wheel is then raised, the chuck moved in, and the inner surface is ground. The lever is then turned over and a .290" size block is placed under the ground forked end to make it level with the other end, and both surfaces are finished.

3/16" of stock is ground off each side to limits of +.002". 8 pieces (16 surfaces) are ground per hour.

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Send for your free copy of "Work Done on the Blanchard." This book shows over 100 actual jobs where the Blanchard Principle is earning profits for Blanchard owners.

Tool Builders' Position Analyzed In Statement to House Committee

Peculiar problems to be confronted in postwar period by the industry taken into consideration by War Department Price Adjustment Board in developing policy. . . Excessive profits held shown by the record

AFTER thorough study of the problem, the War Department Price Adjustment Board has concluded the machine tool industry will face peculiar problems of demand in the postwar period, but at the same time the evidence points to the fact the industry is realizing excessive profits from its current production for war.

This was testimony offered by Herbert J. Taylor, vice chairman, of the board in a statement regarding machine tool industry profits, read recently before the House Naval Affairs Investigating Committee which has been looking into renegotiation of contracts.

Mr. Taylor pointed out in his statement that a number of machine tool contractors have made the claim that, in view of the particular and peculiar factors surrounding the operations of their industry, it has not realized excessive profits and should therefore be exempt from renegotiation.

"These machine tool contractors," he said, "base their contention that their current profits are not excessive on the fact that the war has forced an enormous expansion in output of machine tools to such an extent that the industry is now producing 'ten years normal output in one year' and has provided such an enormous inventory of machine tools in the hands of American industry that demand for new tools will, in the near future, become almost non-existent as a result of this saturation.

"An examination of the machine tool industry serves to indicate that the four years, 1936 through 1939, were years of good business for this industry and may justifiably be used in comparing peacetime and war profits.

"We have figures covering operations for a number of years on nineteen companies which do approximately 40 per cent of the machine tool volume. In 1942, sales of these nineteen companies amounted to $535,900,000, an expansion of almost eight times average annual sales in the 1936-39 base period, which amounted to $67,700,000. Profits before income taxes amounted to $172,500,000 in 1942, an expansion of more than sixteen times the average annual profits in the base period which amounted to $10,500,000. It is interesting to note that the rate of profits per dollar of sales increased from 15.6 per cent in the base period to 32.2 per cent in 1942.

"It is true that the high tax rates in force during 1942 substantially reduced the earnings available to stockholders. However, net earnings after all income taxes for the nineteen companies amounted to $45,500,000 in 1942, an expansion of five and one-half times the average annual net income after taxes of $8,200,000 earned by the same companies in the base period. These nineteen companies had total net worth at the beginning of 1942 of $103,900,000. Thus, we see that profits before income taxes amounted to 166 per cent of net worth, and profits after income taxes amounted to 44 per cent of the net worth of these companies at the beginning of the year. That this rate of profits to net worth, despite heavy taxes, is far above the average is indicated by a compilation by the National City Bank of the net profits of 1336 manufacturing companies which show 1942 profits after income taxes of only 10.1 per cent of their net worth at the beginning of the year. Thus, net profits after all taxes for the machine tool industry were more than four times higher in relation to net worth than existed for a broad sample of American industry.

"The depression period for the machine tool industry (as evidenced by losses from operation) covered the five-year period 1930-34 inclusive. The next five years, 1935-39, represented favorable business for this industry, and the following three years (1940-42) were a period of extremely active war production.

"It is interesting to note that during the worst depression in history the machine tool industry, as reflected by these nineteen companies, suffered operating losses of $17,900,000, and these losses together with nonoperating losses and dividends paid exhausted $38,300,000 of the invested capital at the beginning of this depression period. In sharp contrast to this picture is the experience of the last three years during which these representative nineteen companies earned $100,700,000 after all taxes, which is more than their entire invested capital at the beginning of the great depression of the 30's.

"During the last three years alone, despite heavy taxes and despite the disbursement of dividends which appear liberal, the industry was able to more than double its net worth at the beginning of the emergency war period.

"The machine tool industry was the first industry to receive an impetus from the defense program which began in 1940.

"A comparison of balance sheets at the end of 1939 and at the end of 1942 indicates that net working capital expanded from $35,500,000 to $57,100,000, an increase of $21,600,000. In addition, these companies have $12,600,000 of postwar tax credit which will become liquid funds in the period after the cessation of hostilities. The combination net working capital and the postwar credit now amounts to $69,700,000 and compares with net working capital of only $41,000,000 at the end of 1929. A net sum of $15,500,000 has been invested in plants since the beginning of 1940 and $27,500,000 in miscellaneous assets.

"It is true that peak demand for machine tools appears to have been reached. The National Machine Tool Builders Association estimates sales in 1943 will decline to $1,000,000,000 from $1,300,000,000 reached in 1942.

"We have discussed the outlook of machine tool sales with members of the production department of the Army who have expressed the opinion that sales will not decline below $500,000,000 in 1944 and will continue at that annual rate as long as the war lasts. Prior to 1940 sales of the industry had never exceeded $200,000,000, with the exception of one year during the last war.

"Although shipments will decline in 1943 and 1944, it would appear sales for the duration will be more than two times any prewar experience of the industry. The major reasons we are inclined to ac-

THE OTHER SIDE

Recent testimony at the hearing by the House Naval Affairs Committee on the subject of contract renegotiation brought out sharply opposing views. In STEEL, page 91, July 5 issue, the opinions of two leading machine tool builders were presented. In the accompanying article the position of the War Department Price Adjustment Board is given. — The Editors.

cept this estimate of minimum volume of $500,000,000 are:

"1. The tremendous demand for machine tools by our Allies, England, Russia, China and the others.

"2. The development of more efficient machines which make obsolete large numbers of machine tools currently being used for war production, and, in view of the manpower shortage, it is believed that the production policy of the War Department will require replacement of these older machines; and

"3. The usefulness of the machine tool industry's plants and skilled labor as a subcontractor on munitions, which is a field which has yet to be tapped by the machine tool builders.

"It is the period after the war which worries the more realistic members of the machine tool industry. No one can accurately forecast industrial conditions in general, or conditions in the machine tool industry in particular, during the postwar period.

"However, one must keep in mind several factors:

"1. During the last war, the machine tool industry created a considerable backlog of machines. Examination of the record indicates that in only one year in the ten years following the war, namely the depression year of 1921, did sales by the industry fail to exceed the highest level in prewar years.

"2. It is true total production during the current war period far exceeds anything in the past, but it must be remembered that machine tools are being used harder by industry than at any time in the past.

"3. A very considerable part of the production of machine tools in recent years has been exported to foreign countries for use in war industry, and consequently, does not saturate domestic demand.

"4. The industry has proven that it can develop new and more efficient machinery which makes obsolete many of the machines it has produced in recent years.

"5. Many tools produced during recent years by the industry are specialized for production of armament articles only and have no adaptation to peace-time industry.

"The above factors have been cited not in an effort to refute the claims of the machine tool industry that saturation is a real problem, but merely to try to appraise how much saturation may well affect sales of this industry. We feel there is ample evidence to indicate the machine tool industry will have a considerable volume of sales in the postwar period.

"The industry had in 1942 a large amount of profits from sales not subject to renegotiation and these profits were not disturbed or considered during the conduct of renegotiation. Sales not subject to renegotiation were composed almost entirely of sales to Defense Plant Corp. and sales on which delivery and payment had been completed prior to April 28, 1942. If this ratio were to hold good for the entire industry on 1942 volume, less than one-half the estimated sales of $1,300,000,000 in 1942 are subject to renegotiation. Thus, about $600,000,000 of sales in 1942 are not subject to renegotiation and this compares to total sales of only $200,000,000 in the best prewar years. As a consequence, the industry may be able to earn more money than at any time during peace-time from its 1942 non-renegotiable business alone.

"Because of its postwar saturation problems, the machine tool industry has received special consideration in renegotiation.

"In conducting renegotiations, the War Department has taken into consideration all the factors surrounding the operations of the industry. The highlights of our approach, together with the evaluation of the factors have been as follows:

"1. The production record of the industry has been outstanding and due credit has been given for this factor.

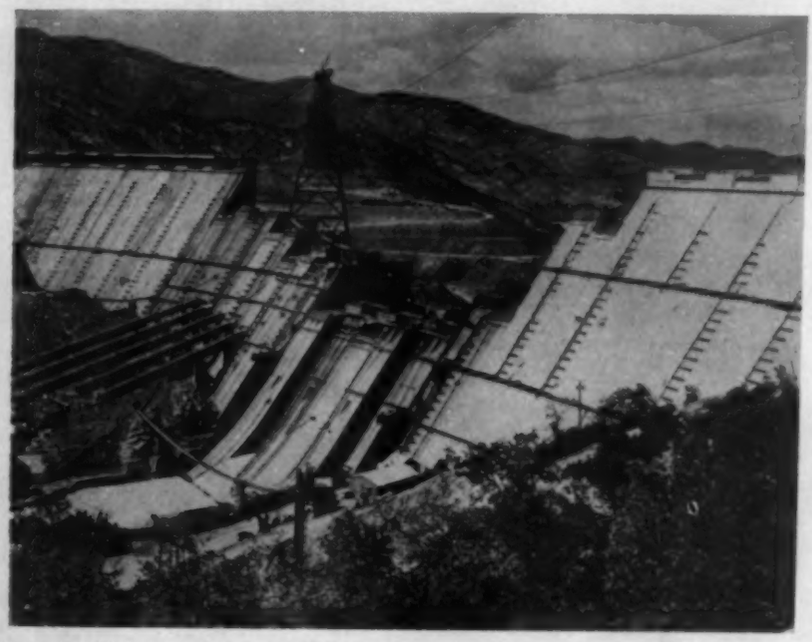
"2. The creative record of the industry in terms of creating efficient machinery has been among the best in American industry and due consideration has been given for this factor.

"3. On the question of price of its products, the machine tool industry does not compare favorably with some industries which have aggressively pursued the policy of reducing prices as costs decline.

"4. In achieving the enormous expansion in volume, the industry has used substantial amounts of government assistance both in terms of plants furnished by the government and working capital advances. In this connection, the machine tool industry stands about mid-way of American industry as many industries have received more government assistance and many have received less.

"5. In connection with risks, the machine tool industry has probably the outstanding risk of saturation of any industry. On the other hand, the industry does not face problems of conversion of plant operations from munitions to peacetime products.

"The machine tool industry has a very high rate of net profit to sales before taxes. The machine tool industry has been left after renegotiation with profits higher in relation to sales than most other industries, which is a reflection of the peculiar problems of the industry."



SACRAMENTO HARNESSED: Shasta Dam, the giant concrete structure that will transform the raging Sacramento river into a docile waterway, now is in the final phase of mass concrete placement. Started in July, 1940, a 900-foot section of the right abutment, upper left, is complete to roadway and sidewalk level. Less than a million yards of concrete remain to be added to the entire dam. NEA photo

PRIORITIES-ALLOCATIONS-PRICES

Weekly summaries of orders and regulations, together with official interpretations and directives, issued by War Production Board and Office of Price Administration

INSTRUCTIONS

PREFERENCE RATINGS: Form PD-3A, preference rating instrument used by the Army, Navy, Maritime Commission and other government agencies, will remain in use, although originally the expiration date was June 30.

ALLOTMENT NUMBERS: One allotment number may be substituted for another allotment number on an authorized controlled material order which has been placed with a mill, without changing the position of the order in the mill schedule, War Production Board rules. In such a case, the order will be treated as though it bore the substituted allotment number when order was placed originally, according to interpretation No. 10 to CMP regulation No. 1.

If at the time the allotment symbol is substituted the order itself is otherwise materially changed, the order is to be treated as a new order. Changes which would constitute a new order include the following: (1) A change in the form or shape of the product ordered; (2) advancing of the delivery date; (3) an increase in the quantity ordered. A person substituting one allotment number for another must have an allotment, identified by the substituted number, to support the order.

ELECTRICAL SUPPLIES: All rated orders for wire and cable are now invalid unless they are accompanied by an allotment of materials under CMP. However, CMP provides for procurement of certain warehouse replacement stocks which was not affected by the June 30 cancellation date and can be obtained without the use of allotment numbers. Manufacturers have been directed to set aside certain percentages of their production capacity for warehouse replacements.

GAGE RODS: Beginning with fourth quarter, the following items will be classified as "B" products and will be under the jurisdiction of the WPB industry divisions indicated below: Gage rods and rail clips, Transportation Equipment Division; nut locks and clip bolts, Building and Materials Division; mine ties, Mining Equipment Division.

Producers of these products should file application for allotment forms CMP-4-B with the industry divisions indicated, setting forth their controlled materials requirements for the fourth quarter of 1943 and the first and second quarter of 1944. Such applications should be submitted at the earliest possible date.

L ORDERS

CUTLERY: Production of the following types of cutlery will be permitted at the following levels, based on amount produced in year ended June 30, 1941: Professional food processing, 225%; professional kitchen, 75%; household kitchen, 35%; household table, 50%; pocket, 60%; scissors, 65%; shears and trimmers, 65%; large heavy-duty hand hair and fetlock clippers, 45%; light weight hand hair clippers, 25%, for export only; industrial, 200%. Silver-plated flatware, surgical instruments, and articles subject to order L-30-d (Miscellaneous Cooking Utensils) are exempt. Bans use of metal in production of hunting knives, carving sets, poultry shears, and manicuring instruments. Reduces numbers of patterns within permitted lines. Imposes restrictions on lengths of blades of some knives and minimum specifications are prescribed for hardness of knife blades and sharpening steels. Prohibits processing of metal for production of cutlery included for free distribution or in connection with advertising or sales promotion. (L-140-a)

IRON BOILERS: Manufacture of low pressure cast iron boilers is now permitted on a month-to-month basis at a rate not in excess of 100 per cent of productive rate of the corresponding month in 1940. Manufacture of such boilers after July 1 had been prohibited under the original order. Filing of PD-704 is required for military, war housing and hospital use of low pressure boilers. (L-187)

MACHINERY: Restrictions on deliveries of certain items of construction machinery for civilian use have been eased slightly. Post hole diggers, hand carried concrete surfacing machines and "finishers and rodding machines for wet concrete" have been made available for civilian as well as military use. (L-192)

VACUUM CLEANERS: No applications for permission to fabricate or assemble industrial vacuum cleaners or blowers will be approved in the future unless accompanied by an order rated AA-5 or higher or unless the applicant indicates a need for the machine justifying such a rating. Rug scrubbing and rug shampooing machines have been brought under control of order L-222. Any authorization issued on PD-418 for production or sale of machinery covered by the order must have been approved prior to July 6 to be valid. Restrictions on floor sanding and floor maintenance machines are tightened by requiring WPB authorization for sale or manufacture of such machines made in sizes smaller than those heretofore specified (L-222)

POWER BOILERS: Conservation of the use of steel in manufacture of heavy duty steam boilers is ordered in L-299 which provides that power boilers, except those for locomotives or marine service, may not have a greater metal thickness or quantity of steel than needed to meet the minimum thickness requirements of the American Society of Mechanical Engineers Boiler Construction code. Boilers affected are those for a design pressure exceeding 15 lb. per square inch. Restrictions do not apply to boilers in process on July 1 or those into which a tube is rolled. (L-299)

INDEX OF ORDER REVISIONS

Subject	Designation
Abrasives	M-319
Cutlery	L-140-a
Boilers, Iron	L-187
Boilers, Power	L-299
Farm Supplies	M-330, PR No. 19
Imports	M-63
Machinery	L-192
Shipways	P-14-a, b
Vacuum Cleaners	**L-222**
Price Regulations	
Core Binder	GMPR
Fluorspar	No. 126
Machines	No. 136
Stoves	No. 64

M ORDERS

IMPORTS: Articles containing 25% or more of copper, brass or bronze not elsewhere specified in general imports order M-63, have been added to List II, made up of commodities whose importation must be authorized but whose distribution after arrival is not restricted. Removed from this list are other finished manufactures made from these metals, save those plated with platinum, gold or silver. (M-63)

ABRASIVES: Following changes have been made in the order controlling supply of manufactured crude abrasive and abrasive grain: Unfused or levigated alumina are excluded from provisions of the order; orders for crude or grain authorized on form WPB 2779 or WPB 2781 must be accepted and delivered if they meet regularly established prices and terms; sequence of deliveries of these orders and of small grain orders not specifically authorized on a WPB 2781, may be scheduled now without regard to preference ratings in the order best suited to maximum production and customers' needs; requirement of a preference rating for "small grain orders" has been eliminated; use of aluminum oxide grain in grit sizes 80 and coarser is prohibited for certain purposes, including blasting or polishing operations for all stone or monumental work, lithographic plate grinding, glass grinding, hulling operations, and non-slip purposes. (M-319)

FARM SUPPLIES: If a distributor's orders from farm distribution outlets for any listed item calls for deliveries in excess of the amount ordered set aside, he may prorate deliveries on the basis of normal shipments regardless of preference ratings (other than AAA). (M-330)

P ORDERS

SHIPWAYS: Revocation of orders giving Maritime Commission shipyards preference ratings in buying materials for construction of shipyards and other facilities has been deferred until Aug. 1. On revocation of the orders, priority assistance will be applied for on form WPB-617, formerly PD-200. (P-14-a, b)

PRIORITIES REGULATIONS

FARM SUPPLIES: Farmers' cooperatives and any other dealers who sell listed farm supplies at cost or at a markup of not more than 3 per cent, are permitted to replenish stocks on farmers' certificates on a dollar-for-dollar basis. The last date on which a dealer may place an order for farm supplies in anticipation of the receipt of farmers' certificates to cover the amount of his order has been postponed from July 1 to July 17. (PR No. 19)

PRICE REGULATIONS

CORE BINDER: Core-binder, a corn product used in the metal industries because of its adhesive qualities, has been exempted from price control, effective July 10. (General Maximum Price Regulation)

STOVES: Deliveries on contracts or sales made after July 1 of canteen model-1942 and cooking stoves (gasoline, one burner) model 1941 to the armed forces will be subject to price control; deliveries pursuant to contracts entered into before that date remain exempt. Exemption from price control of all sales to the United States or an allied government of specified articles has been extended to Oct. 1, 1943. (No. 64)

FLUORSPAR: General increases of about $5 a ton in maximum prices for all grades of fluorspar, effective July 1, have been authorized. Metallurgical grades have a ceiling of $30 to $33 a ton, depending upon the grade sold. These new prices are to be effective only for a period of 60 days, after which prices for grades with an effective calcium fluoride content in excess of 60% may be charged only on sales approved by WPB. New ceiling prices for acid and ceramic grades are $37 a ton with adjustments for freight differentials. OPA reserves the right to revoke the $1.50 portion of the increase granted to encourage production if it appears new development is not being encouraged in the degree necessary. Crude fluorspar ores are exempted. Toll agreements for grinding, milling, or other processing of crude ores are also exempt from price control. (No. 126)

MACHINES: Industrial floor surfacing and floor maintenance machinery is now listed specifically as an item covered by price regulation No. 136. (No. 136)

Several Technical Changes Made In Orders Affecting Steel Industry

SEVERAL technical changes in regulations and orders affecting the steel industry were announced by the War Production Board within the past ten days. These actions are as follows:

1—Order M-21-c, which schedules steel plate production, was revoked, its function now being supplanted by the Controlled Materials Plan.

2—Order M-21-d, covering corrosion and heat resistant chrome steel, was amended to permit the use of stainless steel on authorized controlled material orders. Previously, use of stainless steel was permitted only on AA-5 or higher rated orders.

3—An interpretation of priorities regulation No. 1 makes it clear that production directives are not to be interfered with by rated orders for the use of facilities.

4—Steel mills may not establish consigned stocks in the plants of their customers under the permission granted in direction 15 to CMP regulation No. 1 for the maintenance of mill stocks. This is stipulated in an amendment to the direction, issued because the original direction has been too broadly interpreted by certain mills.

5—Because of restrictions on shipping, customers ordering steel for export often are unable to furnish delivery instructions at the time orders are placed. Therefore, the requirement that full delivery details be furnished when export orders are placed is waived in the case of Lend-Lease and Board of Economic Warfare orders by direction No. 20 to CMP regulation No. 1.

6—Order M-24-c, has been re-issued, requiring full segregation of alloy steel scrap. Categories covering recently developed alloy steels and irons have been revised. Steel mills and foundries have been asked to initiate at once a continuing survey of receipts of scrap, particularly carbon and alloy turnings, and to report any incorrectly classified receipts, including the car number, shipper, date, and analysis to the Scrap Section of the Steel Division. The revised order specifically prohibits use of any type of scrap listed in the melting of any but alloy steel or iron.

Warning Issued Against Illegal Use of Solder

War Production Board has issued a warning against the illegal use of solder in the automotive repair industry. The board revealed that it has uncovered many cases in which solder has been used as body filler and for other purposes under the guise of radiator solder.

Almost all radiator repair work is done with one-eighth inch solid wire, acid or rosin core solder, and any supplier receiving orders for solder in other forms is cautioned to exercise utmost care in scrutinizing such orders to ascertain that the material is to be used for the purposes specified and for no other.

Seeks Storage Protection Of Critical War Materials

War Production Board with co-operation of other government agencies is taking active steps to assure adequate storage protection of all critical war supplies. As part of the program, the Storage Branch of WPB's Stockpiling and Transportation Division has issued general specifications for the storage of all scarce materials. Specific instructions are being prepared for the storage protection of certain materials which present special problems.

Total of the nation's storage remains fairly constant. With some few additions and some losses by fire, the number of warehouses will remain practically the same for the duration. Best possible use must be made of the floor space available.

For this reason, WPB's Storage Branch is setting up a comprehensive file listing the location of every large warehouse in the United States, showing the type of construction; amount of clear floor space; floor load capacity; alarm systems, sprinkler systems, water supply and other data of fire protection. Each of these warehouses will be checked as to its suitability for all materials on the must-be-protected-at-any-cost list.

It may become necessary to establish storage priorities to make certain that the most critical materials get the kind of protection they require.

Heavy Highway Truck Production Quotas Set

Production of 7500 heavy highway trucks and 241 off-the-highway automobile vehicles has been authorized by War Production Board for the third and fourth quarters.

The 14 companies which will produce the heavy highway trucks are:

Autocar Co., Ardmore, Pa.; Brockway Motor Truck Co., Cortland, N. Y.; Corbitt Co., Henderson, N. C.; Federal Motor Truck Co., Detroit; General Motors Truck & Coach, Pontiac, Mich.; Four Wheel Drive Auto Co., Clintonville, Wis.; International Harvester Co., Chicago; Kenworth Motor Truck Co., Seattle; Peterbilt Motors Co., Oakland, Calif.; Mack Mfg. Co., New York; Reo Motors Co., Lansing, Mich.; Sterling Motor Truck Co., Milwaukee; Walter Motor Truck Co., Long Island City, N. Y.; White Motor Co., Cleveland.

The 241 off-the-highway vehicles include trucks, truck tractors and trailers. They will be manufactured by Dart Truck Co., Kansas City, Missouri; Euclid Road Machinery Co., Cleveland; Kenworth Motor Truck Co., Seattle; Mack Mfg. Co., New York; and Peterbilt Motors Co., Oakland, Calif.

Government Takes Action To Conserve Fluorspar

Fluorspar stocks have not been accumulating in sufficient quantity to insure a satisfactory margin against demands of the armed services and essential civilian requirements, the Fluorspar Section of the War Production Board announces. Therefore, every effort is being made to accelerate production and conserve supplies of this material. An increasingly improved position is anticipated for the remainder of this year, however.

The War Labor Board stabilized wages for the fluorspar industry, giving 1400 workers in the six major companies increases averaging 14 cents per hour. OPA has approved general increases of approximately $5 a ton in maximum prices for all grades of fluorspar.

The importance of fluorspar in steelmaking will be evident when it is realized that it requires about 6 pounds of spar to make 1 ton of steel. This means that to make 80,000,000 tons of steel, 240,000 tons of fluorspar are consumed. Approximately 7 pounds of acid fluorspar are needed to make 100 pounds of aluminum so that 10,000 tons of fluorspar must be provided during 1943 for this purpose.

Use of fluorspar in building warships and planes is as follows:

Type Ship	Displacement	Fluorspar Needed
Battleship	45,000 tons	192 tons
Aircraft Carrier	27,000 "	149 "
Heavy Cruiser	13,400 "	67 "
Light Cruiser	10,000 "	52 "
Destroyer	2,200 "	17 "
Submarine	1,500 "	9 "

Type Plane	Fluorspar Needed
B-17	2,700 pounds
B-24	3,000 "
B-25	1,500 "
PB-2y	4,500 "
P-38	1,000 "
P-47	1,000 "

This redesigned tank part saved **200 TONS** *of scarce metal*

Little things *do* count. For example, this ball retainer ring for tanks was redesigned to save 200 tons of a scarce metal on one tank order!

The designer who perfected the part applied lessons learned in the mass production of roller skates, bicycles, and automobiles. Formerly the ball retainer ring was cast and machined from a critical metal. Now it is formed and punched from steel—all in one operation. Result: Enough metal saved to provide the rotating bands for 177,000 shells and this is just the beginning.

Almost every day some victory-minded engineer comes up with a new idea for the manufacture of war equipment. Peace-time products that might benefit from stampings are being redesigned too. The field is wide open for stampings that save weight, save time and machine hours.

Let us show you how ARMCO's special-purpose sheet steels can help you do the job you want. For complete information on coated and uncoated grades, write to The American Rolling Mill Co., 1411 Curtis St., Middletown, Ohio.

OFFICIAL OWI PHOTO

THE AMERICAN ROLLING MILL COMPANY

SPECIAL PURPOSE ARMCO SHEET METALS

By A. H. ALLEN Detroit Editor, STEEL

MIRRORS of MOTORDOM

UAW postwar program envisages beneficent (to labor) and paternalistic government to lead all from cradle to grave over rose-strewn path. Provides for labor representation in all bureaucratic activities. . . New military truck program planned

"GOVERNMENT or municipal ownership and operation of monopolistic industries and of industries strategically necessary to the national safety"—that is one of the planks of a postwar program just devised by the executive committee of the United Automobile Workers-CIO.

The program is of interest because of the obvious state of wedded bliss existing between organized labor and the Roosevelt administration. Thus, when the union unfolds its grandiose plans for postwar industry in America, it is almost an automatic fact that they will have the blessing of the Roosevelt gang, and hence it becomes doubly important for industry to know the shape of such plans, for after all it may be the guinea pig on which strange new economic medicines will be tried.

Prefacing its plan with the usual statement introducing all postwar programs, to-wit: That the immediate and primary task is to plan and work for an early victory, the UAW goes on to cite what it calls a fundamental prerequisite to the formulation and execution of any democratic postwar plan—full representation and responsibility at all levels for organized labor. Labor must be permitted to participate fully in all activities and in all government agencies charged with any phase of the administration of the war effort. Labor of all nations must sit in responsible positions at the peace table and in treaty negotiations following victory. Labor must be represented at conferences held during the war dealing with postwar problems. Organized labor must be given representation now on the National Resources Planning Board and Congress should grant the board adequate appropriations to enable it to function as a permanent agency.

If these "musts" are not enough, proceed into the union's plans for reconversion of industry. They include: Establishment of national industry-wide councils with equal labor participation to work out reconversion schedules; maintenance of labor standards during the reconversion period against any attempt by industry to lengthen hours, reduce wages or lower living standards; legal protection to all workers who transfer from nonessential to essential war jobs so that they will be guaranteed the right to return to former jobs with accumulated seniority; reserve funds to be established by industry to pay out to its present employes or those who have been inducted into the armed forces, during any postwar unemployment period; and full guarantees to all members of the armed forces covering such little things as a $2500 separation bonus, a peacetime economy of full employment and full consumption, accumulated seniority on former jobs, free education including training for a trade or profession, weekly allowances to disabled veterans, etc.

Full-Blown Utopia

Next come proposals for achieving full employment after the war. First of these is the government ownership plan mentioned above. Then comes government control and regulation of industries to prevent the abuses of monopoly and to assure production in the public interest; a gigantic planned national construction program involving housing, schools, highways, hospitals, recreational facilities, conservation of natural resources and development of more power projects like TVA. On housing, the UAW recommends elimination of temporary war housing to prevent new slum areas and extension of the FHA to permit development of planned workers' communities.

With a deprecating wave of the hand the UAW avers that "industries can no longer be operated to serve private interests where those interests conflict with the public need. Initiative can find its most useful outlet, greatest recognition and highest reward when exerted in the public service." Not only that, but the working week must be reduced to 30 hours without reduction of pay. Patent laws must not, on the one hand, permit industry to build monopolies nor, on the other hand, permit inventions to be withheld from use in order to preserve existing capital investments; they should be amended to provide that patents be subject to use by every industry upon payment of reasonable royalties.

The UAW is simply telling the world that it can think up a postwar dream world along with the best of our visionaries. Utopia, with a capital UAW, complete economic freedom, security and irresponsibility under a beneficent paternalism that will exude from Washington like honey over the land! All initiative and enterprise to be turned over to a federal bureaucracy which will lead everyone from the cradle to the grave down the rose-strewn path of life. Why not even a checkoff to deduct union dues from social security credits?

The UAW also disposes of the farm

150,000TH JEEP: On-the-spot assembly featured the completion of the 150,000th jeep body to come from the plant of the American Central Mfg. Corp., Connersville, Ind. A five-man crew from Willys-Overland, Toledo, O., for which American Central makes the jeep bodies, required just 18 minutes to bolt the body to chassis

problem with a few well-turned proposals:

1. Elimination of the farm tenant through government regulations of land ownership by absentee farmers and limiting of acreage holding, and extensive government purchase and reclamation of land now under absentee control for disposition among working farmers for home ownership under a "homestead act".

2. Guarantee of stability of farmers' income through stabilization of farm prices, with definite floors over extended periods.

3. Extension of adequate crop insurance against the hazards of crop failures, etc.

4. Government control of distribution of farm produce to avoid surpluses and shortages with participation by farmer co-operatives, both in policy making and distribution.

5. Economic use of farm machinery on community basis through government-encouraged pooling projects.

Then the health, education and security of the people must be supervised by this postwar supergovernment. Federal scholarships, complete with living costs, must be granted qualified students. Jobs must be guaranteed in line with courses of study. A new cabinet post of Secretary of Education and Health should be established. A federal social security program should be enacted which will provide adequate protection, from cradle to grave, for every person in America. And a federal insurance agency should be established which will sell to the people at cost, life and other basic insurance policies.

NO ABSENTEE: Eighty-four years old and with 32 years' service with Mack Trucks Inc., Plainfield, N. J., David A. "Dad" Teeter has been tardy only once. When his plant received the Army-Navy "E", Teeter accepted for employes

Heavy-Duty Truck Program

Industry circles report now in the formulative stages the most pretentious manufacturing program for heavy-duty military trucks ever conceived. All principal truck manufacturers will participate, along with the complete list of smaller builders. The vehicles will range in capacity from 2½-ton up to 10-ton and over, nearly all six-wheel jobs with six-wheel drive. Bulk of production is contemplated in a new 7-8 ton model class. Output is slated to start at the turn of the year if not sooner and will aim at something like 10,000 a month.

Power units may be standardized on three or four types of engines such as Hercules, a new Continental engine and a General Motors Truck unit.

Bottleneck of the program is likely to come in axles and transmissions, since there is only a limited number of companies equipped to build these units. Principal one, of course, is Timken-Detroit Axle, but facilities of companies like White Motor, Mack, Eaton Mfg., and Clark Equipment may be pressed into service, and it is possible that some plants formerly busy supplying components for combat tanks and now slowed down can be switched over to truck work.

The new heavy-duty truck program will be superposed on present production schedules, it is said, and reflects the increasing favor of the military for out-size hauling units which in some cases have proved more capable of negotiating rough terrain.

For the last six months of this year, the WPB has authorized the production of 7500 heavy trucks for civilian use, plus an undisclosed number of buses apportioned among a dozen or more manufacturers, virtually the same ones that will participate in the greatly expanded military truck program for 1944.

Letters of intent covering contracts for materials and facilities to produce 5-inch dual purpose gun mounts for the Navy have been received by Fisher Body in Detroit. The contract represents the second largest awarded by the Navy in this district and will be distributed among four plants in the Michigan area. The mount weighs 40,000 pounds complete, and in its manufacturing and assembly requires some of the heaviest equipment yet installed by Fisher. Subcontracts totaling 48 per cent of the dollar volume of the contract have already been awarded outside suppliers.

An example of the high quality of workmanship required in the job is the requisite that welders pass a thorough examination and officially qualify before special naval officers before being assigned to the project. Welded sections are 100 per cent magnafluxed, and the average time consumed in inspection of a complete mount is three weeks. Delivery of the first unit is expected sometime this fall.

Another precision manufacturing job under way here for some time is the Sperry antiaircraft gun director, on which Ford is a principal contractor. There are over 12,000 parts in the director, and a highly involved system of gaging and inspection has been developed. The company was commissioned to build the directors in October, 1941, and will shortly reach production schedules assigned, although output in May matched that of the Sperry company.

Brig. Gen. Alfred R. Glancy, deputy chief of ordnance and chief of the Tank-Automotive Center here, will go on inactive duty this week for an operation which may incapacitate him for several months. He will be succeeded by Brig. Gen. Walter B. Boatwright, now chief of the New York Ordnance District.

FHA Has $500 Million To Aid Postwar Home Boom

The accumulation of a tremendous deferred demand for family dwelling units caused by postponement of nonessential construction until after the war will be met largely by a building program featuring the small-type home financed with the help of FHA mortgage insurance, according to Earle S. Draper, deputy commissioner of the Federal Housing Administration.

Mr. Draper pointed out that under Title 2 of the National Housing Act, about $500,000,000 in mortgage insurance for postwar home building is available and, subject to presidential approval, the authorization of $1,000,000,000 more of insurance can be made available if needed.

Truman Group To Study U. S. Rights in Foreign Airports

To effect immediate settlement of postwar rights of the United States to use airfields and other military installations built abroad by this country, the Senate War Investigating Committee is sending a commission of its members on a world-girdling inspection trip.

Senators Mead, Brewster, Russell, Chandler and Lodge have been delegated to make the trip and report to the Truman Committee.

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MEN of INDUSTRY

George Montague Williams has joined Curtiss-Wright Corp., New York, and will be elected a vice president to assist the president, **G. W. Vaughan,** in directing the company's war effort. Mr. Williams is on leave of absence from the Russell Mfg. Corp., Middletown, Conn., of which he is president, and was previously assistant to **Tom M. Girdler,** board chairman, Consolidated Vultee Aircraft Corp., and Republic Steel Corp., Cleveland.

—o—

E. W. Kempton has been appointed assistant vice president, industrial relations, and **Edward C. Myers,** assistant to the vice president, industrial relations, of the United States Steel Corp. of Delaware. Since January, 1941, Mr. Kempton has been assistant director of industrial relations at Pittsburgh for the corporation. Prior to that appointment he was director of industrial relations for American Steel & Wire Co. with headquarters at Cleveland. Prior to his latest appointment, Mr. Myer was senior staff assistant in charge of personnel, Industrial Relations Department, United States Steel Corp. subsidiaries, Pittsburgh district.

—o—

Roland E. Fulton, has been appointed director of industrial relations, Cook Electric Co., Chicago.

—o—

John T. Llewellyn, president, Chicago Malleable Castings Co., Chicago, and Allied Steel Castings Co., Harvey, Ill., was tendered a testimonial dinner at the South Shore Club, July 7, by approximately 150 of his associates in the two companies on the occasion of his eightieth birthday. He established Chicago Malleable in 1899 and Allied Steel Castings in 1918.

ERNEST MULLER

W. F. KELLY

JOSEPH L. MULLIN

—o—

Ernest Muller has been appointed assistant to **Mark A. Follansbee,** vice president in charge of sales, Follansbee Steel Corp., Pittsburgh. Mr. Muller will devote a major part of his efforts to formulation of the company's postwar objectives. Formerly he was associated with American Steel & Wire Co., Cleveland.

—o—

John B. Whitted, formerly with Stewart-Warner Corp., Chicago, has been appointed chief engineer, Soreng-Manegold Co., Chicago.

—o—

Frank E. Bates, manager of the melting division, Worthington Pump & Machinery Corp., Buffalo, was elected chairman of the Western New York chapter, American Foundrymen's Association. Other officers elected were: **Reinhold D. Loesch,** treasurer, Lake Erie Foundry Co., Buffalo, vice chairman; **J. Ralph Turner,** president, Queen City Sand & Supply Co., Buffalo, secretary; **Martin W. Pohlman,** vice president, Pohlman Foundry Co. Inc., Buffalo, treasurer.

—o—

Joseph L. Mullin has been appointed general superintendent of foundries, American Manganese Steel Division, American Brake Shoe Co., Chicago Heights, Ill. **W. F. Kelly** has been named works manager at the New Castle, Del. plant, succeeding Mr. Mullin.

—o—

James M. Morehouse has been appointed general manager, order division, sales department, Carnegie-Illinois Steel Corp., Pittsburgh, succeeding **Merle N. Smith,** retired. **Russell B. Gunia** has been named manager of the company's stainless steel bureau, metallurgist division.

—o—

Carlton B. Tibbetts, president, Los Angeles Steel Casting Co., Los Angeles, has been appointed chairman of the Los Angeles Committee for Economic Development. Purpose of the committee is to assist commerce and industry in making their maximum contribution to high levels of productive employment in the postwar period.

—o—

Robert L. Coe, vice president, Chase Brass & Copper Co. Inc., Waterbury, Conn., was re-elected president of the Copper and Brass Research Association. **Theodore E. Veltfort** and **Bertram B. Caddle** were re-elected manager and secretary, respectively of the association. Other officers elected were: vice presidents, **Wylie Brown,** president, Phelps Dodge Copper Products Corp., New York; **John A. Coe,** chairman of the board, American Brass Co., Waterbury, Conn.; **William M. Gross,** vice president,

JULIAN M. AVERY

Who has been appointed vice president in charge of research and development, Diamond Alkali Co., Pittsburgh, as announced in STEEL, June 28, p. 74.

J. L. MAUTHE

Who has been appointed operating vice president, Youngstown Sheet & Tube Co., Youngstown, O., as announced in STEEL, July 5, p. 88.

FRED J. WOOD

Scovill Mfg. Co., Waterbury, Conn.; **Curtis L. Smith,** treasurer, National Copper & Smelting Co., Cleveland; **Herman W. Steinkraus,** president, Bridgeport Brass Co., Bridgeport, Conn.; **C. Donald Dallas,** president, Revere Copper & Brass, Inc., Rome, N. Y., was re-elected treasurer.

—o—

Charles J. Stakel, assistant manager, Cleveland-Cliffs Iron Co. mines in Michigan, will become manager of all of the Cleveland-Cliffs Lake Superior mines July 15, succeeding **Stuart Elliott,** who is retiring after 45 years with the company.

—o—

Fred J. Wood has been appointed district manager, Jessop Steel Co. Ltd., Toronto, Ont.

—o—

Stowell C. Wasson, previously works manager, Indianapolis plant, National Malleable & Steel Castings Co., has been appointed manager of the Cicero, Ill. and Melrose Park, Chicago, plants. **R. S. Davis,** assistant manager at Indianapolis since 1929, succeeds Mr. Wasson. **W. M. Ewing** has been elected manager of the Sharon, Pa. plant, succeeding **Walton L. Woody,** who has been elected vice president with headquarters in Cleveland. **Joseph O. Houze,** manager, and **Houston L. Hiatt,** sales manager, Cicero works, have retired.

—o—

Robert N. Yates has been named sales manager, Erie Foundry Co., Erie, Pa.

—o—

Elmer L. Sutherland, managing partner of the New York and Chicago offices of Lawrence Scudder & Co., has been elected vice president, Aeronca Aircraft Corp., Middletown, Ohio.

—o—

Fred I. Merrick has been named chairman of the board, Standard Horse Nail Corp., New Brighton, Pa., succeeding the late **John D. Bruhn. G. B. Sheers** has been made president and general manager; **R. S. Merrick,** vice president; **U. S. Couch,** secretary; **A. L. Bingham,** treasurer; and **C. K. Kennedy,** assistant secretary-treasurer.

—o—

Roy Stephens, executive assistant, and **L. H. LaMotte,** manager, Washington office, have been elected vice presidents, International Business Machines Corp., New York. **Garland B. Briggs,** formerly manager of the Norfolk, Va., office, was elected assistant treasurer. **John E. Zollinger,** previously manager of the Cleveland office, was appointed eastern sales manager, and **Clarence W. Christman** was named manager, department of applications, New York.

—o—

Harry W. Lundin has been named director, safety and plant protection section, department of industrial relations, Monsanto Chemical Co., St. Louis.

OBITUARIES . . .

J. E. MacMurray, 81, founder and former chairman, Acme Steel Co., Chicago, died July 1 in South Pasadena, Calif.

—o—

Otto J. Kuenhold, 62, development engineer in the humidifying department of Monmouth Products Co., Cleveland, died July 2 in that city.

—o—

Frank L. Cross, 72, inventor of the Cross automatic feeder for printing presses and folding machines, died July 1 in Port Washington, Long Island, N. Y. In 1905 Mr. Cross helped organize the Cross Feeder Co. of Boston, and he served as the company's chief engineer until it was purchased by Dexter Folder Co., New York, in 1938.

—o—

Samuel Brown, 72, founder and president, Brown-Dorrance Electric Co., Pittsburgh, died June 25 in that city.

—o—

Frederick F. Skeel, 72, retired vice president and western sales manager, Crouse-Hinds Co., Syracuse, N. Y., died June 25 in Evanston, Ill.

—o—

William James Foster, 72, assistant engineer, alternating current engineering department, General Electric Co., Schenectady, N. Y., died July 2 in that city. In 1931 Dr. Foster received the Lamme medal, awarded annually by the American Institute of Electrical Engineers.

—o—

Louis C. Marburg, 67, co-founder and secretary-treasurer of Marburg Bros. Inc., New York, died June 25 at Montclair, N. J.

—o—

George Stevenson MacMaster, 47, Los Angeles district manager, Otis Elevator Co., New York, died recently in that city.

—o—

John S. Beaton, 67, general superintendent, Perfection Stove Co., Cleveland, before his retirement in 1938, died July 1 in that city.

—o—

Rufus Kellog, 58, former sales manager, Square D Co., Detroit, died June 30 in Fort Lauderdale, Fla.

—o—

Charles H. Wilcox, 86, pioneer of the midwest steel industry, died July 3 in Chicago. Mr. Wilcox joined the late **John W. Gates** in purchasing a number of tin mills which became part of United States Steel Corp., New York.

—o—

Charles W. Underwood, 76, formerly Buffalo district manager for Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., died June 30 in Buffalo.

—o—

George D. McGill, 52, president, McGill Metal Products Co., Marengo, Ill., died July 1 in Chicago.

—o—

W. J. Waterman, 67, W. A. Waterman Inc., Exeter, Calif., died June 21 in that city.

—o—

Henry Scott, 68, former stove manufacturer, died July 6 in Portsmouth, O.

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W. C. Shinn, 73, president, Chicago Lock Co., Chicago, died June 24 in that city.

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Alfred Shakespeare, 58, superintendent, Gear Processing Co., Cleveland, died in that city July 3.

—o—

William Dyson, owner of Hallidie Machinery Co., Seattle, died recently in that city.

—o—

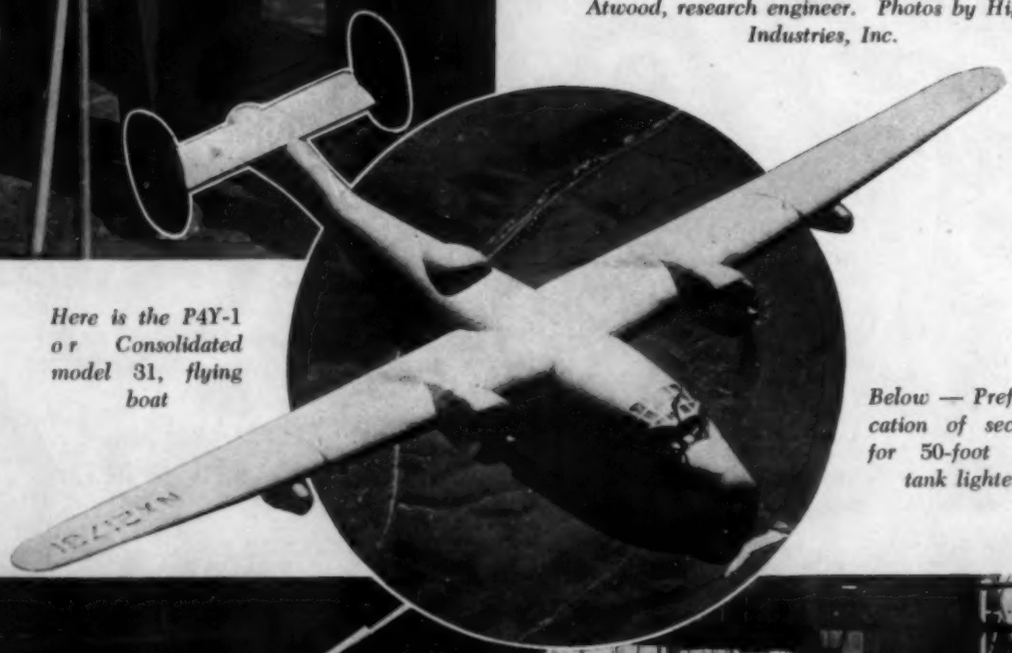
William Hoyt Evilsizer, 40, purchasing agent, Lockheed Aircraft Corp., Burbank, Calif., died recently.

—o—

William H. Smith, 76, field engineer and assistant to the president, Industrial Brownhoist Corp., Bay City, Mich., died July 6 in that city.

Hub of New Industrial SOUTH

Andrew Jackson Higgins (center) and his two chief aircraft aides, Col. John H. Jouett (left), vice president of Higgins Aircraft, and Harry Atwood, research engineer. Photos by Higgins Industries, Inc.



Here is the P4Y-1 or Consolidated model 31, flying boat

Below—Landing ramp is dropped at one end of steel lighter to permit speedy unloading. Cross bars are welded to main supporting channels

Below — Prefabrication of sections for 50-foot steel tank lighters

Crescent City bursting at seams under pressure of war expansion. . . Once greatest banana port in the world, its eyes are focused on bright future wrapped up in cargo planes, new type boats, synthetic rubber, magnesium, oil and plywood

THE CRESCENT CITY, now bursting its seams under the pressure of war production and war shipping, occasionally casts a nostalgic look back on the days when it was the greatest banana port in the world, unloading 23,000,000 bunches a year, but now its eyes are focused on a bright future wrapped up with great new cargo airplanes and new types of boats to probe the unexplored profits of the South American jungles.

Along with these visions are other projects already germinated—synthetic rubber, magnesium, plywood and oil and its by-products.

Today the bananas are no longer coming in as they used to, and much of New Orleans' old-world glamour and beauty have become tarnished by the influx of thousands of soldiers and sailors and by a 31 per cent increase in population (from 580,000), required to staff war activity.

For the city is now an army embarkation point for men and supplies. It is the center of a bustling boat-building industry led by Higgins Industries Inc., Delta Shipbuilding, and others. It is in the throes of developing important airplane production, both at the vast new plant of Consolidated Aircraft along the shores of Lake Pontchartrain, and at Higgins Aircraft.

Much of its former glory as one of the nation's busiest ports, however, has been usurped by neighboring cities, such as Mobile, Port Arthur, Lake Charles and and at Galveston and Houston, Texas.

George Gardiner of the New Orleans Association of Commerce dissents from this view, pointing out that New Orleans is handling more business with Latin America than ever before, and more commercial, as distinguished from military, foreign trade than any port in the United States, not excluding New York. Lines which suspended operations at other ports, especially New York, are operating fleets out of New Orleans. Since Pearl Harbor, 74 foreign freight brokers and forwarders, from other parts of the country, have established offices in New Orleans.

Tour Industrial Installations

Gov. Sam Jones only recently headed a party of New Orleans business men who toured the $200,000,000 port and industrial installations at Lake Charles, and returned amazed. Cities Service Oil Co. there has erected one of the most modern refineries in the world, with crude capacity of 80,000 barrels a day. Still months from operation, this installation also includes a butadiene plant, supplying this material to Firestone which will operate the polymerization plant having capacity of 55,000 tons of latex a year—twice the capacity of the synthetic rubber plant which recently started production at Baton Rouge, operated by Copolymer Corp. Also at Lake Charles, a new magnesium plant has begun limited production.

After viewing the extensive Lake Charles development, Governor Jones said significantly, "Seventy-five per cent of these new factories of which we now boast, if not more, will be lost to us after the war unless we define a program that is sufficiently and logically well founded to hold them."

Many southerners are determined such a loss will not occur and even now are making the "sufficient and logical" plans to avoid it. As in other coastal sections of the country, the planners are not looking back into the country for the future, but out across the stretch of blue ocean, in the case of New Orleans out across the Gulf of Mexico in the direction of Central and South America. They are not only looking that way, but sending their experts out to take soundings. As a harbinger of things to come, Pan-American Airways has announced inception of a trans-gulf flight service to Guatemala from New Orleans. Over a year ago an emissary of Higgins Industries organized an expedition into the jungles of southern Venezuela and the Amazon basin and returned with a plan for conquering the dense reaches of the jungles by means of a new type of diesel-engine amphibian carrier boats which Higgins is prepared to build. Of this, more later.

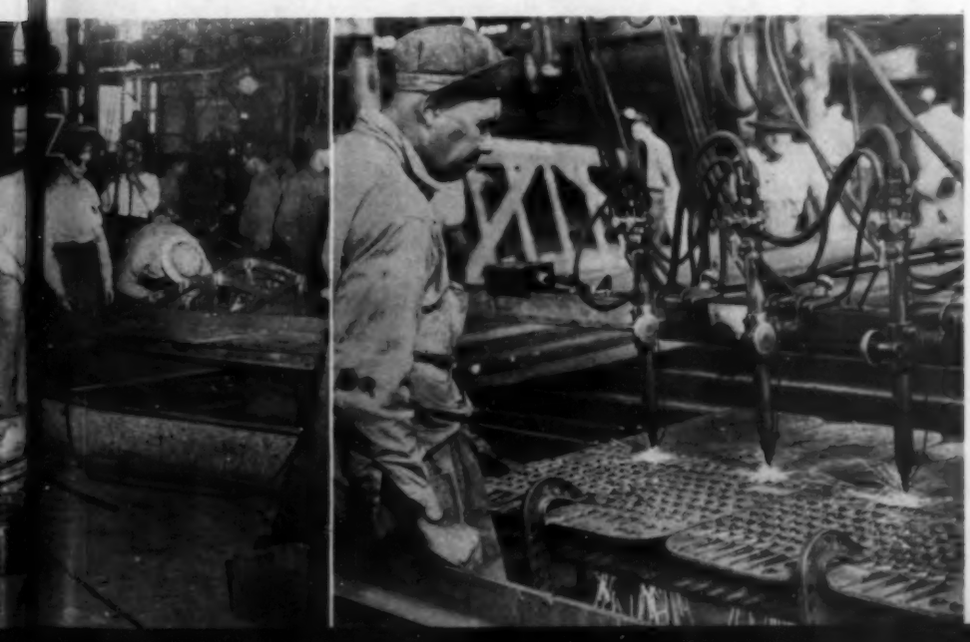
New Orleans civic leaders are proceeding with plans for a huge Pan-American Fiesta to be held in New Orleans after the war to stimulate trade and travel between South-Central America countries and the U. S. As a matter of fact, this fiesta was originally scheduled for Oct. 12, 1942, with William G. Zetzmann, as general chairman, but the war forced its postponement. His committee has mailed out 3000 copies of a prospectus on the celebration and the response has been enthusiastic. For one thing, the promoters estimate it would bring $35,000,000 into the coffers of New Orleans and the state of Louisiana.

Many Fiestas Planned

(*Ed. Note:* Apparently there are going to be a lot of fiestas after the war, for both in Southern California and in San Francisco, there is talk of new and bigger expositions such as the one held on Treasure Island in Oakland Bay, which gave a terrific lift to business and industry in the Bay Area. Doubtless the Pacific Northwest would demand a fiesta there too, for its backers are sure it has come of age industrially and commercially, and all three Pacific regions are planning various inviting trade gestures which they will make toward distant shores after the war).

One of the main business arteries of New Orleans is, strangely enough, a canal—the Inner Harbor Navigational canal it is called officially, or the Industrial canal popularly—connecting the Mississippi on the south to Lake Pontchartrain on the north, with a lock at the river end. This is a 5-mile channel

Below at right — Multiple-torch cutters burning out small pieces of reinforcing from heavy-gage ship plate



Laying out patterns on large section of plate for prefabrication of tank lighter component. Photo by Higgins Industries, Inc.

30 feet deep and 150 feet wide, constructed and operated by the Board of Commissioners of the Port of New Orleans. Along both sides is an industrial "reservation" of several thousand acres, docks for an assortment of commercial enterprises such as the Jones & Laughlin Steel Corp. docks, terminus for river shipments of steel down the Mississippi by barge. Both banks of the canal are protected by levees for their full length, and approximately at the center are four slips. Ample property is still available for industrial development, a recent newcomer being the Industrial canal plant at Higgins Industries, now building a variety of the smaller types of all-steel military craft such as tank lighters, landing barges, etc.

Northern terminus of the canal is just to the west of the New Orleans municipal airport, originally known as Shushan airport, built on a half-square mile of triangular shaped land jutting out into Lake Pontchartrain. Southern end meets the Mississippi just across from the naval reservation and navy docks in Algiers, the river here being about ¾-mile wide.

It may not be known generally, but the city of New Orleans is over 100 miles up river from the Gulf of Mexico. Incoming vessels use one of two passes—the South pass with depth of 30 feet and width of 750 feet, or the Southwest pass, with 35 foot depth and 1000-foot width.

Storehouse of Chemicals

Total length of publicly owned and improved wharf frontages at New Orleans is nearly 8 miles and represents an investment of $50,000,000. This is in addition to a large number of privately owned facilities at the port. State facilities include a cotton warehouse for 462,000 bales; a grain elevator of 2,622,000-bushel capacity; a bulk commodity handling plant for such materials as coal, coke, ore and sulphur; and a bulk vegetable oil handling plant for cocoanut oil, palm kernel oil, olive oil foots, linseed oil, etc.

Oil, salt, sulphur, natural gas, limestone, oyster shells, cellulose from trees, cotton plants and bagasse, plus large quantities of pine, gum, ash and cypress lumber and their derivatives have made the state of Louisiana a storehouse of chemical raw materials, and chemical manufacturing industries have gravitated to the New Orleans area in recent years, along with oil refineries and their new cousins, the synthetic rubber industries. The district is becoming an important center, as well, for tung oil or China wood oil, following the planting of thousands of acres of cutover lands to tung trees.

Andrew Jackson Higgins is a magical name in New Orleans these days, and some of the boys sitting around the bar at the Roosevelt hotel, sipping their Ramos gin fizzes, like to call him the Henry J. Kaiser of the South. But proud New Orleanians take this as an insult, for their Andrew Jackson, they stoutly maintain, puts to shame the West Coast industrial giant and easily outdistances comparison. Both, it must be admitted, are distinct phenomena.

Andrew Jackson Higgins is no newcomer to New Orleans, and he was not always the "great guy" he is made to appear today. Born in Columbus, Nebr., in 1886, he built his first boat, it is recorded, at the age of 12 in his family's home cellar in Omaha. At 22 he was operating a sawmill in Mobile and exchanging his own dressed lumber for cargoes of tropical woods from Caribbean countries. This did not last and he moved to New Orleans where he started a similar lumber and export business, which collapsed in the hard days of 1922.

Meanwhile, he kept up his interest in fast boats, and Higgins speed boats held many records in Mississippi and Gulf races. Shortly before the turn of the '20s, Andrew Jackson Higgins hit upon the Eureka-type boat, a relatively small powered craft capable of travel in swamps and low water, with propeller and shaft protectively encased in a tunnel in the hull. The boats looked promising for oil company exploration work through the Louisiana bayous and along the

Hangar building, boat house and start of ramp leading into Lake Pontchartrain are shown in this view along the seawall. Main plant is back to the right, while in the distance is the municipal airport extending out into the lake. Photo by Leon Trice

The Huey P. Long bridge across the Mississippi at New Orleans, a $13,000,000 rail and highway structure 4.4 miles long completed late in 1935. From the top of the steel superstructure at the center to the bottom of the central pier 170 feet below mean Gulf level is a distance of 400 feet. Photo by New Orleans News

Amazon. But the depression caught up with Higgins Industries in 1931 and Eureka'd them into receivership.

Somehow Higgins limped through the succeeding years until 1936 when he received orders for two river steamer inspection boats for the government. Then came the war, and orders for Eureka boats for England, Finland and the U. S. Navy. Because of their ruggedness and shallow draft, these boats make excellent landing craft, and by now have been built in several versions, seeing extensive service with both British and U. S. forces.

Higgins is looking far beyond the present conflict for profitable use of his Eureka boats. As mentioned before, they and some of their progeny are visioned as the means for opening up the Amazon jungles for economical removal of crude rubber. Key to the plan is a new type of amphibian ship-truck which can operate in shallow water, climb over rocks and drive along river banks. Establishment of regular inland routes for fleets of these amphibians, with additional barges and diesel tugs for open-water use seem to suggest the possibility of opening up the Amazon interior and perhaps even of providing waterway connection between Venezuela, Brazil and Colombia so that profitable use can be made of vegetable and mineral resources which cannot now be reached.

Higgins Industries boat plants are three in number, the previously mentioned Industrial canal plant, where most of the welded steel boat and tank lighter construction work is carried out; the second the City Park avenue plant, where operations are principally with wood, and the third a St. Charles avenue plant which has now reverted to a salesroom. It was near the latter location where some time ago Higgins was building boats in the street outside the plant, to the consternation of old New Orleans residents. This work now, however, has been shifted to the other two plants.

The company is now in process of taking over a fourth plant, a building formerly occupied by the Continental Can Co., reportedly for manufacture of a new type of landing barge engine. In all Higgins employes number about 12,000 and they constitute a devoted and enthusiastic family, all paid-up members of the A. F. of L. incidentally.

Higgins Aircraft Plans Bud

But the most fabulous of the new Higgins enterprises is the budding Higgins Aircraft Corp. plant now going up amidst the swamps of the Micheaud (Mee-shoo) district of New Orleans. Originally this location was to be the scene of a shipyard, where Higgins was going to out-Kaiser Kaiser on Liberty ships. They would be launched in an extension of the Intracoastal canal, an inland waterway which now connects New Orleans with Houston and Corpus Christi, Tex., without touching the Gulf, and eventually will be cut on through from New Orleans to Mobile, Ala. Suddenly, last summer, the Maritime Commission canceled the Liberty ship contract with Higgins, and New Orleans began buzzing with wonderment. A little thing like this did not daunt old A. J. who bustled off to Washington and returned with a letter of intent from the Air Corps to build 1200 Curtis C-76 cargo airplanes of plywood. Even before the Maritime Commission had finished tearing down the start of the shipyards, Higgins engineers and surveyors were moving into the 1200-acre Micheaud property to figure out how to make an aircraft plant grow where a shipyard had started to take shape. The site is only 6 feet above sea level and while you can get plenty of argument that this is no swamp around New Orleans, nevertheless, the story is that engineers had to fight off snakes and alligators while they were struggling to get the plant foundations in. Plant design was developed by Albert Kahn Associated Architects and Engineers, Detroit, which has a field crew on the scene. As of June 1 the plant was about 75 per cent completed and some equipment was moving in, although in December the Higgins Aircraft people said it would be ready by April 1 and the first plane would roll out by July 1. Obviously no such miracle will be wrought.

Among other novel aspects of the Micheaud plant will be installation of a neat 10,000 ton capacity air conditioning system.

A. J. did not fool when he started his airplane organization. First he went out and signed up Col. John H. Jouett, then head of the languishing Aeronautical Chamber of Commerce of America, and well acquainted with airplane designers and engineers throughout the country. He became a vice president of Higgins Aircraft. In a February speech, Col. Jouett told the Texas section of the S.A.E. that the new aircraft plant would be completed by June, and the first plane by November. Right now it looks as though even the colonel were being a little over optimistic.

Then, in January of this year, came to New Orleans air famous Guiseppe Mario Bellanca, 56-year-old founder, chairman and director of Bellanca Aircraft Corp., Wilmington, Del. Reason: To work for Higgins Aircraft in developing a cargo airplane. On Jan. 28, the United Press carried a story quoting Higgins in connection with his "supercargo" plane to the effect that it would be a modified type of "flying wing", with displacement of 400,000 pounds, adding that he expected it to be in production "very soon" in large quantities and at low cost. As if this were not enough, A. J. further confounded his listeners by adding that his aeronautical experts

were working on a postwar helicopter, to sell for around $1500, and designed "something like the jalopy in the automobile business."

The Curtis Caravan plane, or C-76 as the Army calls it, is said to be the first plane designed primarily as a short-route cargo carrier, each plane requiring in its construction 50,000 square feet of plywood. The plane has two engines, standard gross weight 35,000 pounds, 20,000 pounds empty. Average cruising speed is 160 miles an hour; fuel capacity 600 gallons. The plane has tricycle landing gear and the floor of the cargo hold is only 36 inches off the ground. It loads both at the nose and at the side, has an interior track hoist and is fitted to tow gliders (or at least was originally). These data are from a recently issued OWI report on air transport.

So, with Higgins Aircraft planning to build 1200 C-76s, it began to look like the company was going to need sixty to seventy million feet of plywood, and New Orleans is a long way from Portland, Oreg., now the center of the plywood industry. So Higgins early this spring announced plans for a small plywood plant to be built in New Orleans. This led to a storm of protest in Congress by senators from the West Coast and the North, among them Senator Wiley of Wisconsin. Higgins countered with the statement the plant was "definitely if not desperately needed to insure success in completing contracts for Army plywood planes."

Of the C-76 airplane, the OWI states: "It is being built in large part under subcontract with a Virginia plastic firm, a piano company in Ohio, and a Kentucky plant which has been manufacturing tobacco hogsheads, army bunks and bodies for trucks and station wagons."

Higgins' venture into plywood may be tied in closely with the activities of one Harry Atwood, researcher with Higgins Aircraft, who has developed what is called a "sensational kind of woven plywood". Atwood also is busy on the Higgins giant cargo plane. Another member of the Higgins Aircraft engineering braintrust is George Allward who has had extensive experience in the use of plywood and plastics in airplane fuselages, once being associated with Duramold and Fairchild companies, and later with the Howard Hughes organization in Culver City, Calif. It is Hughes, incidentally, who is now working with Kaiser on his "superdooper" cargo plane to be built on the West Coast.

Four other aces-in-the-hole on which Andrew Jackson Higgins can count are his sons—Edmond C., Andrew J. Jr., Frank O., and Roland C. The first, Edmond, is manager of the new Industrial canal plant. Andrew Junior is general manager of the City Park plant. Frank is general manager of the Higgins Aircraft plant, and Roland, for the present, is in the Army, but before entering the service last December he was superintendent of construction of landing boats.

Brother Directs Repair Plant

A. J. also has a brother, Frank P. Higgins, who is in charge of the St. Charles salesroom and repair plant. He, in turn, has two sons, Edward and Jack, the former now in the Army and the latter a student at Tulane University. This phase of Higgins activity revolves around handling New Orleans and the Gulf Coast sales and service of Hall-Scott and Gray Marine engines; Lorimer, Enterprise and General Motors diesels; skiffs, sailboats and pleasure cruisers; Evinrude and Elto outboard motors; Higgins ship-to-shore telephones; Carrier air conditioning units, and marine hardware and appliances—no small assignment in itself.

First airplanes from New Orleans probably will not be Higgins-built, but rather Consolidated's P4Y patrol bombers for the Navy. In a spacious and modern plant along Lake Pontchartrain near the airport and at the north end of Franklin avenue, equipment and personnel are rapidly being assembled for this undertaking and the first plane should roll down a ramp on its beaching gear and into the lake by late fall.

The P4Y-1 is a new two-motor seaplane which has been hailed by the Navy as the fastest flying boat ever built. Prototype is Consolidated Vultee's model 31, shown in an accompanying illustration. This new patrol plane, which Consolidated has christened the Corregidor, is designed for combat and cargo duty. It will be powered with two 2000-horsepower motors, is 74 feet long, 25 feet high and weighs about 25 tons. Wingspread is 110 feet.

The new plant, with reinforced concrete columns and asbestos shingle walls, was erected originally for Nash-Kelvinator Corp. to assemble Vought-Sikorsky Excalibur flying boats, with numerous subassemblies coming from Nash plants in the north. Months ago, however, the Navy suspended the contract, Nash engineers and other personnel went back home and Consolidated was brought into the picture, for reasons never fully explained to the public.

In the switch to the new design considerable modification has been called for in the plant itself. Inasmuch as the Nash-Kelvinator flying boat was to be largely an assembly job, provision was not made in the original buildings for many of the manufacturing processes required by Consolidated. Consequently a machine tool and drop hammer building has had to be added, additional space for engineering, accounting and administrative employes, a larger ramp and numer-

(*Please turn to Page* 151)

They Say:

"I can think of no better training for a business man in the handling of his present labor problems than to take a place on a Labor Board panel, or on the board itself."—**Roger D. Lapham,** retiring industry member, National War Labor Board, and president of the American-Hawaiian Steamship Co., San Francisco.

• • •

"Another major development of the year has been improvement in shipbuilding technique to where, as far as possible, mass production methods are used."—**Lynn H. Korndorff,** president, Federal Shipbuilding & Dry Dock Co.

• • •

"We are not worrying about competition from light metals and plastics when the war ends. Creating facilities does not create a market."—**Benjamin F. Fairless,** president, United States Steel Corp.

• • •

"What is most urgently needed is the application of plain, hard-headed common sense to our problems. We need to think a lot less about politics and a lot more about winning the war."—**Eric A. Johnston,** president, Chamber of Commerce of the United States.

• • •

"America cannot remain strong and free if in the postwar period we have too much unemployment for too long. That is a direct invitation to dictatorship."—**Paul G. Hoffman,** president, Studebaker Corp., South Bend, Ind., chairman, Committee for Economic Development.

May Plate Production Heavy

Output during month represents 136.8 per cent of capacity. Average for five months of year 141.9 per cent. Tonnage maintained at high level in other products

PRODUCTION of steel products for sale in May totaled 5,586,447 net tons, according to the American Iron and Steel Institute. Iron products totaled 14,711 tons, pig iron 777,239 tons and ingot molds 84,474 tons.

Cumulative total of steel products for the year to June 1 was 27,781,209 tons, of which 2,038,772 tons were shipped to other members of the industry.

Steel plate production for May was 1,067,858 tons, which represented 136.8 per cent of rated capacity. For five months average production was at 141.9 per cent of capacity.

Sheet production was 683,627 tons, at 59.6 per cent of capacity. For five months sheet output averaged 65.2 per cent of capacity. The lower rate in sheets is a result of plate production on sheet mills.

Steel bars produced in May totaled 20,568 tons, which represented 120.5 per cent of capacity.

Total number of companies included in these statistics is 183, which in 1942 represented 98.8 per cent of the total output of finished rolled products. In accordance with government policy export figures cannot be published and these columns are blank in the accompanying table, which supplies full statistics for May and five months this year.

Factory sales of mechanical stokers in May totaled 2436 units, compared with 2464 in April and 5053 in May, 1942, according to the Bureau of the Census. For five months sales have been 12,808 compared with 41,027 in the corresponding period in 1942.

AMERICAN IRON AND STEEL INSTITUTE
Capacity and Production for Sale of Iron and Steel Products

MAY - 1943

		Number of companies	Item	Annual Capacity Net tons	Production for Sale—Net Tons: Current Month: Total	Current Month: Per cent of capacity	Current Month: Shipments: Export	Current Month: Shipments: To members of the industry for conversion into further finished products	Year to Date: Total	Year to Date: Per Cent of capacity	Year to Date: Shipments: Export	Year to Date: Shipments: To members of the industry for conversion into further finished products
Steel Products	Ingots, blooms, billets, slabs, sheet bars, etc.	44	1	xxxxxxx	722,478	xxx		207,008	3,390,017	xxx		985,844
	Heavy structural shapes	10	2	5,412,580	320,010	69.6		xxxxxxx	1,606,698	71.7		xxxxxxx
	Steel piling	3	3	338,000	3,958	13.7		xxxxxxx	9,404	6.7		xxxxxxx
	Plates—Sheared and Universal	21	4	9,189,740	1,067,858	136.8		2,273	5,395,835	141.9		17,211
	Skelp	6	5	xxxxxxx	70,371	xxx		37,920	335,591	xxx		177,701
	Rails—Standard (over 60 lbs.)	4	6	3,629,260	136,443	44.3		xxxxxxx	747,580	49.8		xxxxxxx
	Light (60 lbs. and under)	6	7	309,690	16,363	62.2		xxxxxxx	66,516	51.9		xxxxxxx
	All other (Incl. girder, guard, etc.)	2	8	102,000	1,288	14.9		xxxxxxx	11,866	28.1		xxxxxxx
	Splice bar and tie plates	13	9	1,120,270	52,652	55.3		xxxxxxx	271,882	58.6		xxxxxxx
	Bars—Merchant	40	10	xxxxxxx	592,267	xxx		91,380	2,978,341	xxx		591,958
	Concrete reinforcing—New billet	15	11	xxxxxxx	25,379	xxx		xxxxxxx	172,858	xxx		xxxxxxx
	Rerolling	16	12	xxxxxxx	7,258	xxx		xxxxxxx	37,473	xxx		xxxxxxx
	Cold finished—Carbon	23	13	xxxxxxx	148,761	xxx		xxxxxxx	732,023	xxx		xxxxxxx
	Alloy—Hot rolled	20	14	xxxxxxx	270,336	xxx		37,324	1,260,625	xxx		191,488
	Cold finished	18	15	xxxxxxx	40,774	xxx		xxxxxxx	196,435	xxx		xxxxxxx
	Hoops and baling bands	4	16	xxxxxxx	9,938	xxx		xxxxxxx	39,097	xxx		xxxxxxx
	TOTAL BARS	63	17	14,706,525	1,094,713	87.6		128,704	5,416,832	89.0		583,446
	Tool steel bars (rolled and forged)	17	18	200,840	20,568	120.5		xxxxxxx	100,556	121.0		xxxxxxx
	Pipe and tube—B. W.	15	19	2,236,040	109,085	57.4		xxxxxxx	545,501	58.9		xxxxxxx
	L. W.	8	20	845,400	41,723	58.1		xxxxxxx	235,049	67.2		xxxxxxx
	Electric weld	7	21	1,149,250	95,820	98.1		xxxxxxx	424,103	89.2		xxxxxxx
	Seamless	15	22	3,082,400	182,261	69.6		xxxxxxx	892,620	70.0		xxxxxxx
	Conduit	7	23	190,000	5,185	32.1		xxxxxxx	26,071	33.2		xxxxxxx
	Mechanical Tubing	11	24	597,800	64,023	126.1		xxxxxxx	312,103	126.1		xxxxxxx
	Wire rods	21	25	xxxxxxx	99,037	xxx		16,792	495,605	xxx		99,167
	Wire—Drawn	41	26	2,566,150	158,073	78.6		4,982	814,614	83.2		23,910
	Nails and staples	19	27	1,116,640	67,442	71.1		xxxxxxx	357,021	77.3		xxxxxxx
	Barbed and twisted	15	28	482,280	21,851	53.3		xxxxxxx	101,025	50.6		xxxxxxx
	Woven wire fence	16	29	778,060	20,202	30.6		xxxxxxx	84,952	26.4		xxxxxxx
	Bale ties	12	30	128,420	9,745	89.3		xxxxxxx	45,081	84.8		xxxxxxx
	All other wire products	8	31	78,220	4,894	73.6		xxxxxxx	26,049	80.5		xxxxxxx
	Fence posts	11	32	125,065	2,253	21.2		xxxxxxx	8,975	17.3		xxxxxxx
	Black plate	10	33	339,700	25,752	89.2		-	120,136	85.4		-
	Tin plate—Hot rolled	5	34	508,620	1,215	2.8		xxxxxxx	8,168	3.9		xxxxxxx
	Cold reduced	10	35	3,816,340	201,701	62.2		xxxxxxx	807,652	54.3		xxxxxxx
	Sheets—Hot rolled	25	36	xxxxxxx	478,119	xxx		17,977	2,542,729	xxx		80,357
	Galvanized	14	37	xxxxxxx	62,524	xxx		xxxxxxx	337,130	xxx		xxxxxxx
	Cold rolled	14	38	xxxxxxx	115,381	xxx		xxxxxxx	613,736	xxx		xxxxxxx
	All other	14	39	xxxxxxx	27,603	xxx		xxxxxxx	151,076	xxx		xxxxxxx
	TOTAL SHEETS	28	40	13,497,570	683,627	59.6		17,977	3,644,671	65.2		80,357
	Strip—Hot rolled	22	41	3,200,890	125,814	46.3		14,737	644,353	48.6		71,136
	Cold rolled	39	42	2,057,340	96,791	55.4		xxxxxxx	470,703	55.3		xxxxxxx
	Wheels (car, rolled steel)	5	43	424,820	20,062	55.6		xxxxxxx	94,287	53.6		xxxxxxx
	Axles	6	44	453,470	13,875	36.0		xxxxxxx	70,105	37.4		xxxxxxx
	Track spikes	11	45	308,350	12,369	47.2		xxxxxxx	63,620	49.9		xxxxxxx
	All other	5	46	42,000	16,985	476.0		xxxxxxx	85,968	494.6		xxxxxxx
	TOTAL STEEL PRODUCTS	159	47	xxxxxxx	5,586,447	xxx		430,393	27,781,209	xxx		2,038,772
	Pig iron, ferro manganese and spiegel	26	48	xxxxxxx	777,239	xxx		315,191	3,754,583	xxx		786,745
	Ingot moulds	5	49	xxxxxxx	84,474	xxx		xxxxxxx	400,216	xxx		xxxxxxx
Iron Products	Bars	10	50	170,110	7,775	55.8		72	41,247	58.6		1,381
	Pipe and tubes	2	51	106,000	6,100	67.7		xxxxxxx	37,277	85.0		xxxxxxx
	All other	1	52	56,000	838	17.6		-	6,622	28.6		-
	TOTAL IRON PRODUCTS (ITEMS 50 to 52)	11	53	xxxxxxx	14,711	xxx		72	85,146	xxx		1,381

4802 Operating In United States

Total decreases by ten in two years. . . Canada adds 46. . . Chicago leads cities

FOUR thousand eight hundred and two foundries are in operation in the United States, according to the 1943-44 edition of *Penton's Foundry List*, recently compiled by the Penton Publishing Co., publishers of STEEL. This represents a loss of ten foundries since the list was last compiled in 1941.

During the same two-year period, the number of foundries in Canada increased by 46, bringing the total to 493 in the Dominion.

A complete tabulation of the casting plants in United States and Canada is shown in the accompanying table.

Number of gray iron foundries decreased from 3006 to 2890, although the shrinkage has been confined to the smaller plants. Steel foundries increased in number from 298 in 1941 to 334 in 1943. Increase in capacity has been greater.

The number of exclusive nonferrous foundries increased from 1446 in 1941 to 1506 at present. Nonferrous departments of other foundries decreased from 1354 to 1114.

Chicago again occupies first place as a foundry city with a total of 159. Other leading centers and number of foundries: Los Angeles, 133; New York, 116; Cleveland, 106; Detroit, 92; Milwaukee, 69; Philadelphia, 67; Boston, 56; Toronto, 55; St. Louis, 51; Cincinnati, 51; Mineapolis and St. Paul combined, 60.

FOUNDRY DISTRIBUTION—UNITED STATES AND CANADA

	Total Foundries 1943	Total Foundries 1941	Increase or Decrease in two years	Gray Iron Foundries 1943	Gray Iron Foundries 1941	Steel Foundries 1943	Steel Foundries 1941	Electric Steel Foundries 1943	Electric Steel Foundries 1941	Malleable Foundries 1943	Malleable Foundries 1941	Exclusive Nonferrous Foundries 1943	Exclusive Nonferrous Foundries 1941	Nonferrous Foundries Dept. of Other Shops 1943	Nonferrous Foundries Dept. of Other Shops 1941	Total Nonferrous Foundries 1943	Total Nonferrous Foundries 1941	Aluminum Foundries 1943	Aluminum Foundries 1941	Magnesium Foundries 1943	Permanent Mold 1943	Machine Shop 1943	Pattern Shop 1943	Laboratories 1943
Alabama	90	89	+ 1	80	80	6	4	4	2	3	2	7	7	14	22	21	29	12	17	..	2	64	65	18
Arizona	7	6	+ 1	7	6	3	2	3	2	..	..	..	..	4	5	4	5	1	3	1	2	4	7	1
Arkansas	18	21	— 3	15	18	1	1	1	1	..	..	2	2	5	10	7	12	2	7	..	..	13	9	1
California	331	302	+29	136	137	30	21	29	19	2	3	126	135	60	69	186	199	166	165	19	25	137	157	66
Colorado	39	45	— 6	20	27	4	3	2	2	1	1	14	13	4	8	18	21	14	20	1	5	20	16	11
Connecticut	126	122	+ 4	56	59	5	6	5	5	8	7	61	57	26	29	87	86	56	70	4	7	71	71	35
Delaware	11	11	....	6	5	3	2	2	1	1	1	3	3	4	4	7	7	4	4	1	..	8	8	3
Dist. of Columbia	2	1	+ 1	2	1	1	1	1	1	..	..	..	..	2	1	2	1	2	1	..	..	1	2	1
Florida	33	29	+ 4	24	25	1	1	1	1	..	1	10	4	18	23	28	27	18	24	1	1	22	23	3
Georgia	70	65	+ 5	61	56	3	2	2	1	..	..	7	7	27	35	34	42	24	33	..	3	48	51	3
Idaho	6	7	— 1	5	6	1	..	1	..	..	..	..	..	5	6	5	6	2	4	..	..	6	5	1
Illinois	373	385	—12	204	217	25	23	15	13	18	19	128	136	57	73	185	209	137	170	13	22	211	231	104
Indiana	210	199	+11	126	131	12	9	9	7	10	10	63	55	43	49	106	104	74	79	3	9	113	117	55
Iowa	80	80	....	59	57	5	4	4	2	2	2	13	13	24	30	37	43	33	36	..	2	51	56	27
Kansas	49	49	....	41	42	1	1	1	1	..	..	8	7	17	30	25	37	22	30	1	2	36	35	9
Kentucky	36	36	....	24	25	..	..	..	..	..	..	12	10	7	10	19	20	11	13	..	2	25	23	3
Louisiana	33	30	+ 3	24	25	5	5	4	4	..	..	7	4	18	18	25	22	15	15	1	2	21	21	6
Maine	24	25	— 1	22	23	..	..	..	..	..	..	2	2	13	16	15	18	10	12	..	..	15	15	2
Maryland	44	48	— 4	31	34	..	..	..	..	1	1	12	13	13	15	25	28	15	19	1	..	28	25	12
Massachusetts	207	211	— 4	114	117	8	9	7	8	3	5	89	85	44	45	133	130	89	101	5	7	92	103	42
Michigan	336	318	+18	176	180	23	21	22	15	10	11	131	108	62	70	193	178	137	123	18	23	177	176	106
Minnesota	100	98	+ 2	73	71	3	4	2	3	1	1	23	22	22	30	45	52	36	41	2	11	62	56	22
Mississippi	13	14	— 1	12	13	1	..	1	..	..	..	..	1	10	9	10	10	2	5	..	1	12	8	2
Missouri	104	116	—12	59	68	12	9	10	7	1	2	39	36	11	19	50	55	39	45	2	8	57	66	36
Montana	8	9	— 1	8	9	..	..	..	..	..	..	..	..	6	9	6	9	1	4	..	1	8	7	1
Nebraska	19	21	— 2	14	16	1	1	1	1	..	..	4	4	9	11	13	15	12	13	..	2	15	14	2
Nevada	3	3	....	3	3	..	1	..	1	..	1	..	..	3	3	3	3	..	..	..	..	1	3	1
New Hampshire	23	24	— 1	15	16	2	2	2	1	1	1	7	7	9	10	16	17	12	13	..	..	12	13	2
New Jersey	172	176	— 4	81	85	7	6	6	5	2	4	80	83	24	31	104	114	75	96	4	6	90	80	41
New Mexico	1	1	..	1	1									1	1	1	1	..	1	..	..	1	1	
New York	398	382	+16	203	216	22	15	18	12	14	15	167	142	82	101	249	243	183	187	15	26	229	231	103
North Carolina	65	63	+ 2	60	60	..	..	..	..	..	..	5	2	29	42	34	44	31	35	..	4	43	45	..
North Dakota	4	5	— 1	3	4							2	1	1	3	3	4	3	2	..	..	4	4	..
Ohio	503	507	— 4	279	289	34	34	29	26	17	21	187	177	79	82	266	259	203	212	20	27	286	284	164
Oklahoma	40	36	+ 4	28	25	1	1	1	1	..	..	8	10	13	15	21	25	20	22	1	3	28	28	4
Oregon	50	55	— 5	35	40	6	5	5	3			8	9	16	22	24	31	15	23	..	..	23	25	10
Pennsylvania	519	557	—38	328	350	61	58	34	33	16	17	138	137	120	155	258	292	168	209	4	25	339	343	139
Rhode Island	38	36	+ 2	18	16	..	1	..	..	2	3	9	19	5	6	14	25	19	23	..	1	16	17	10
South Carolina	21	19	+ 2	20	19	..	..	..	..	..	..	1	..	15	15	16	15	10	13	..	1	16	16	2
South Dakota	3	3	....	3	3	..	..	..	..	..	..	..	..	2	2	2	2	2	2	..	..	3	3	1
Tennessee	72	73	— 1	63	60	1	3	1	2	..	..	7	8	23	29	30	37	19	23	1	1	32	54	16
Texas	108	104	+ 4	69	70	10	9	9	8	..	1	26	28	34	40	60	68	51	56	..	5	61	64	22
Utah	18	18	....	14	15	1	1	1	1	..	..	4	3	6	9	10	12	7	10	..	..	7	10	5
Vermont	16	16	....	14	14	..	..	..	..	..	..	2	2	3	8	5	10	4	6	..	..	12	11	1
Virginia	68	71	— 3	64	68	2	3	1	2	..	..	3	3	39	42	42	45	30	36	..	3	47	43	10
Washington	85	90	— 5	49	58	18	14	17	12	1	1	24	23	29	33	53	56	39	44	1	5	34	38	17
West Virginia	38	39	— 1	26	28	2	2	1	1	1	1	9	9	15	19	24	28	14	21	..	3	27	26	8
Wisconsin	186	196	—10	114	117	13	14	14	13	11	10	57	64	41	39	98	103	71	85	..	11	105	100	63
Wyoming	2	1	+ 1	1	1	..	..	..	..	..	..	1	..	..	1	1	1	1	1	..	..	1	1	1
Total	4802	4812	—10	2890	3006	334	298	266	217	126	141	1506	1446	1114	1354	2620	2800	1911	2174	129	258	2754	2807	1192
Alberta	12	14	— 2	10	11	1	1	1	1	..	..	1	2	9	10	10	12	8	12	..	1	10	11	1
British Columbia	55	48	+ 7	41	35	8	5	7	5	1	1	13	9	26	27	39	36	30	30	3	4	28	32	8
Manitoba	17	14	+ 3	10	8	2	2	2	2	..	..	5	5	3	3	8	8	8	8	1	2	10	13	6
New Brunswick	9	11	— 2	8	10	..	..	..	..	..	..	1	1	5	7	6	8	3	5	..	1	7	7	2
Newfoundland	5	3	+ 2	4	3	1	1	1	1	..	..	..	..	4	3	4	3	3	3	..	..	2	4	1
Nova Scotia	23	21	+ 2	21	19	2	2	2	1	1	1	1	1	15	15	16	16	10	10	1	1	15	16	4
Ontario	255	244	+11	174	179	9	8	7	4	11	11	58	50	76	94	134	144	117	120	5	11	174	159	51
Prince Edward Island	4	2	+ 2	3	2	..	..	..	..	..	..	..	..	2	1	2	1	1	1	..	..	3	2	..
Quebec	106	85	+21	66	59	11	9	8	8	2	1	20	18	36	43	56	61	53	57	2	9	69	63	28
Saskatchewan	7	5	+ 2	6	5	..	..	..	..	..	..	..	..	3	5	3	5	3	4	..	..	5	5	..
Total	493	447	+46	343	331	34	28	28	22	15	14	99	86	179	208	278	294	236	250	12	29	323	312	105
U. S. and Canada	5295	5259	+36	3233	3337	368	326	294	239	141	155	1605	1532	1293	1562	2898	3094	2147	2424	141	287	3077	3119	1297

Reclaim Tool Steel Scrap

To meet increased demand for special alloys. . . Acute shortage of tungsten, cobalt

INCREASED demand for tool and special alloy steel has caused an acute shortage of tungsten, molybdenum and cobalt. This in turn has intensified interest in the salvaging of tool steel scrap, a matter which often was neglected before the alloy shortages developed.

Because of lack of experience of most users with this type salvage, it is being directed by producers and dealer-specialists.

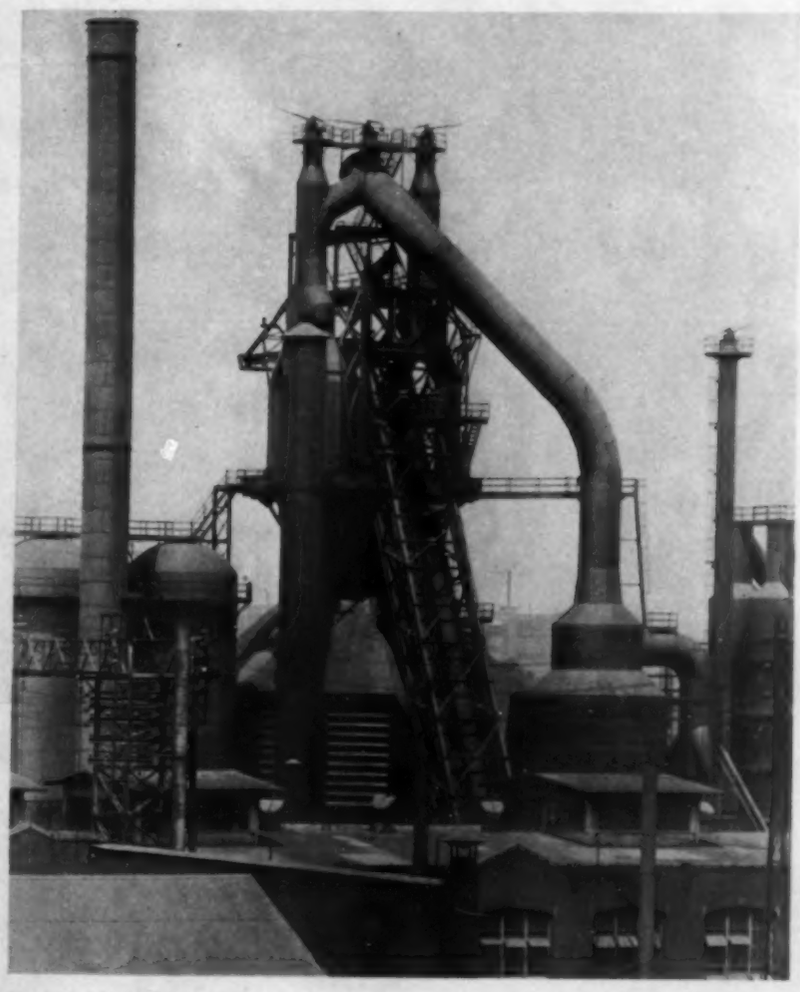
Tool steel scrap includes high-speed steel scrap materials with a tungsten content of 1 per cent or more or a molybdenum content of 1½ per cent or more with or without cobalt. It appears on the market in the form of broken, obsolete and worn-out tools, machine shop millings and turnings and broken or obsolete industrial supplies and equipment.

Most common articles manufactured from tool steel are: augers, blanking and molding dies, bolt headers, boring tools, broaches, chisels, cutters, medical instruments, drill rods, finishing tools, friction saws, gages, hack saws, high duty shafts, high-speed drill bits, hot saws, lathe tools, metal dies, metal punches, milling tools, reamers, rivet sets, rock drills, saws for cutting and slitting, shear blades, taps.

If the alloy content of the scrap is not known, most common method of identifying it is the spark test. In this test both ends of the article are sparked on a 30 to 60 grain emery wheel traveling at a surface speed of from 7500 to 8000 feet a minute. Presence of different alloying elements in steel produce different sparks which enable a trained operator to identify the article as to type of tool steel scrap.

Major consumers of tool steel scrap are the producers of tool and high-speed steel. These companies include: Allegheny Ludlum Steel Corp., Dunkirk, N. Y.; Braeburn Alloy Steel Corp., Braeburn, Pa.; Bethlehem Steel Co., Bethlehem, Pa.; Carpenter Steel Co., Reading, Pa.; Columbia Tool Steel Co., Chicago Heights, Ill.; Copperweld Steel Co., Warren, O; Crucible Steel Co. of America, New York; Henry Disston & Sons Inc., Tacony, Philadelphia; Heppenstall Co., Pittsburgh; Firth-Sterling Co., McKeesport, Pa.; Ingersoll Steel & Disc Co., New Castle, Ind.; Jessop Steel Co., Washington, Pa.; Latrobe Electric Steel Co., Latrobe, Pa.; Simonds Saw & Steel Co., Lockport, N. Y.; Midvale Co., Nicetown, Philadelphia; Universal-Cyclops Steel Co., Bridgeville, Pa.; Vanadium-Alloys Steel Co., Pittsburgh; and Vulcan Crucible Steel Co., Aliquippa, Pa.

Dealers specializing in handling tool steel scrap are equipped to spark-test and in some cases to make a chemical analysis of the scrap. These include: Metallurgical Products Co., Philadelphia; Frankel Co. Inc., Detroit; I. Schumann & Co., Cleveland; M. N. Landay Co., Pittsburgh; Philip G. Smith Co., Detroit; and Chicago Alloy Products Co., Chicago.



MORE IRON CAPACITY: New stack blown in at Bethlehem Steel Co.'s Bethlehem, Pa., plant July 1. Installation includes three stoves; turbo blower of 100,000 cubic feet of air a minute capacity at 30 pounds per square inch pressure; two 100,000 pounds per hour boilers, combination coal and blast furnace gas fired; new water intake and pumping station; electric precipitation equipment for final cleaning of blast furnace gas

Industrialists Support Minerals Stockpiling

Support for the creation of a peacetime stockpile of strategic metals for use in any future emergency has been given by private industry representatives in further hearings on the Scrugham bill (STEEL, July 5, p. 77).

R. C. Allen, vice president, Oglebay Norton & Co., Cleveland, said all critical metals produced in this country in excess of domestic needs or a ten-year period should be placed in the mineral reservoir.

F. E. Wormser, secretary, Lead Industries Association, New York, proposed government-held mineral supplies be held from the market after the war to prevent a price sag.

Sidney Ball, New York mining engineer, expressed the opinion a new war will require a quantity of metals even greater than needed in the present conflict. He proposed this country accept domestically scarce minerals in international exchange as a means of building up stocks.

THE BUSINESS TREND

Indexes Mirror Critical Snags in War Production

THE enormous proportions of American war output, tangible proof of continued pressure on production facilities, still do not blot out a precipitant decline in activity of several of its principal components. The markedly lower rates of steel and coal production and shrinkage in carloadings recorded recently inevitably impaired the momentum of the industrial machine.

STEEL—Production of open-hearth, bessemer and electric furnace ingots was recovering last week after dropping 6½ points to 92 per cent of capacity as a result of the coal strike. This was the lowest rate set by the industry since early July, 1941. A year ago the rate was 97½ per cent.

CARLOADINGS—Loadings of revenue freight during the period ended June 26 totaled 760,844 cars, a decrease of 107,397 units from previous week and 92,574 fewer cars than were loaded in like period a year ago. Largest loss was in coal loadings, 97,743 units. Decreases of 10,153 cars for ore and coke and of 7495 units for forest products accounted for most of the deficiency.

COAL—Bituminous and anthracite operations have been almost fully restored to the pre-strike rate. For the week ended June 26, latest available date, soft coal output fell to 775,000 tons, off 1,242,000 tons from preceding week.

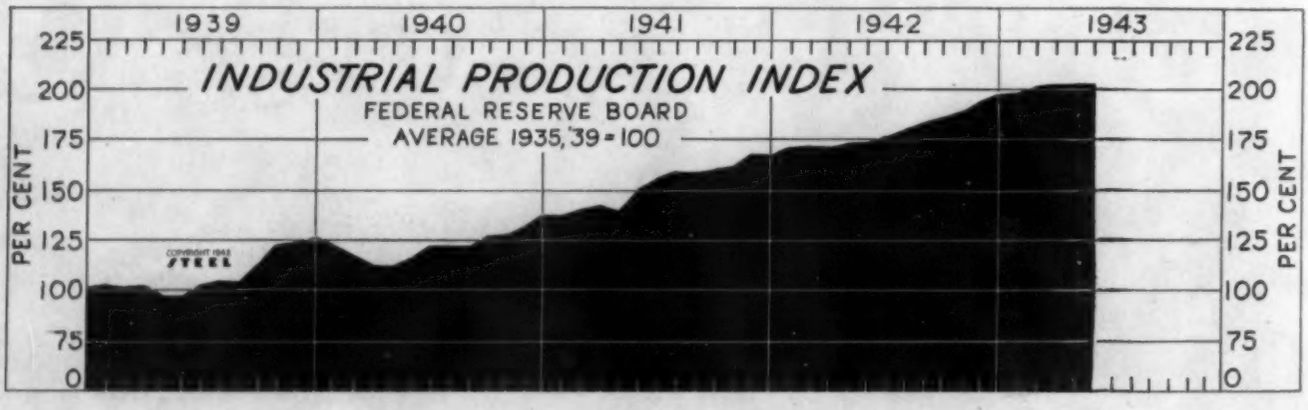
MANPOWER—New estimates of War Manpower Commission call for an increase of 3.6 million men between now and next July. Two million more men are needed for the armed services and 1.6 million more workers for munitions industries. Non-agricultural industries are expected to reduce their labor requirements by 2.3 million.

MACHINE TOOLS—Although the industry looks for a marked decline from present levels of activity by early 1944, as the job of equipping war plants draws to its end, the time has not yet arrived when actual tool operations can be appreciably reduced.

CIVILIAN GOODS—Drive is again under way to boost output of many needed consumer items. Vigorous objections have been voiced by the armed services and WPB members supervising allotments of steel, copper and aluminum, but the program being drawn up by WPB's division of civilian requirements has formidable political support.

Scheme envisages manufacture of a broad list of consumer goods which are not short the country over but are critically scarce in certain areas. A. D. Whiteside, WPB vice chairman, believes that by mobilizing the nation's technological skill he can make more of some civilian items with fewer critical materials.

MAY PRODUCTION—With the exception of ammunition, aircraft and one class of merchant vessels, volume of war production in May was virtually unchanged from April, according to the War Production Board. The tapering off of the production chart-line on which WPB's findings are based corresponds with the performance of Federal Reserve Board's index of industrial production which failed to show an increase for May over the April level of 203.



FIGURES THIS WEEK

INDUSTRY	Latest Period*	Prior Week	Month Ago	Year Ago
Steel Ingot Output (per cent of capacity)	92.0	98.5	98.5	97.5
Electric Power Distributed (million kilowatt hours)	4,000††	4,120	3,990	3,424
Bituminous Coal Production (daily av.—1000 tons)†	775	2,017	1,967	1,904
Petroleum Production (daily av.—1000 bbls.)	3,946††	3,955	3,933	3,297
Construction Volume (ENR—unit $1,000,000)	60.1	53.7	106.9	217.8
Automobile and Truck Output (Ward's, number)	18,645	19,185	16,215	22,680

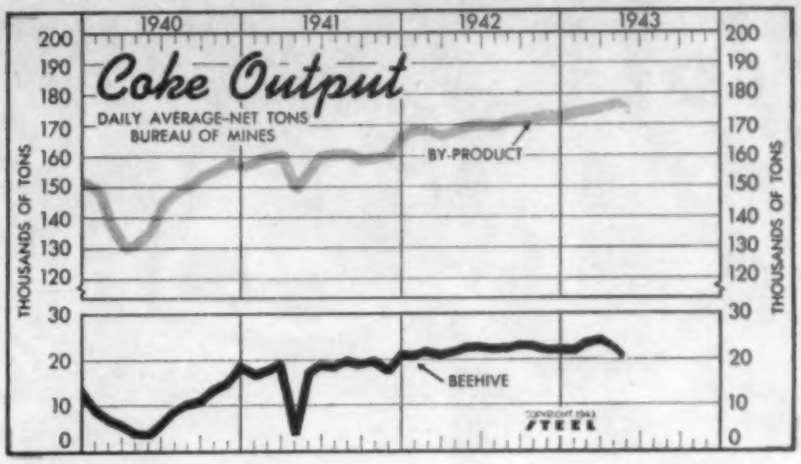
*Dates on request. †Lag of one week. ††Preliminary.

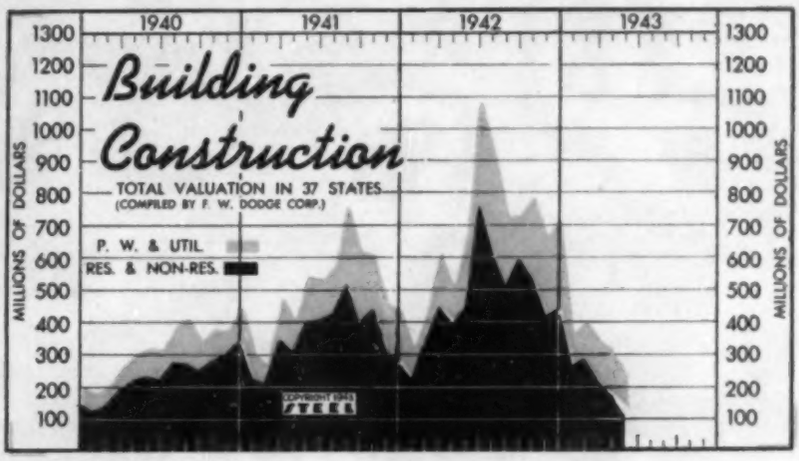
TRADE				
Freight Car Loadings (unit—1000 cars)†	836†	761	668	853
Business Failures (Dun & Bradstreet, number)	66	60	56	186
Money in Circulation (in millions of dollars)	$17,420	$17,154	$17,196	$12,431
Retail Sales (change from like week year ago)	+12%	+14%	+15%	+29%††

††Six months. †Preliminary.

Coke Output
Bureau of Mines
(Daily average—Net tons)

	—By-Product—		—Beehive—	
	1943	1942	1943	1942
Jan.	174,044	168,508	21,440	20,874
Feb.	175,107	168,414	23,991	21,771
Mar.	175,051	167,733	24,369	21,032
Apr.	175,857	168,960	22,932	21,843
May	174,240	170,187	21,298	22,571
June	.....	170,593	.....	22,487
July	.....	170,244	.....	22,197
Aug.	.....	171,443	.....	22,333
Sept.	.....	172,110	.....	23,106
Oct.	.....	172,211	.....	23,148
Nov.	.....	173,029	.....	22,106
Dec.	.....	173,163	.....	22,000
Average	.....	170,549	.....	22,122



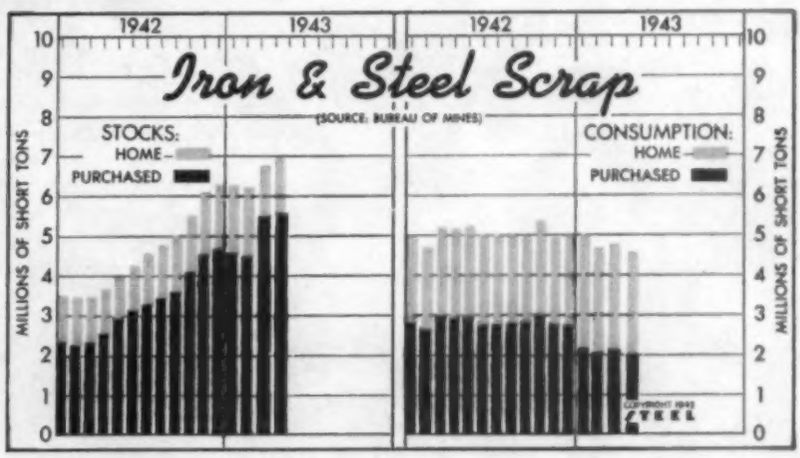


Construction Valuation
In 37 States
(Unit—$1,000,000)

		Public Works-Utilities		Residential-Non-Res.	
	Total	1943	1942	1943	1942
Jan.	350.7	85.8	90.8	264.8	226.0
Feb.	393.5	112.9	95.9	280.5	337.6
Mar.	339.7	123.0	159.7	216.7	451.1
April	303.3	127.7	101.7	175.6	397.0
May	234.4	95.8	227.7	138.6	445.8
June	.....	.....	436.4	.....	753.8
July	.....	.....	327.3	.....	616.4
Aug.	.....	.....	213.1	.....	507.9
Sept.	.....	.....	129.6	.....	593.6
Oct.	.....	.....	246.2	.....	534.2
Nov.	.....	.....	241.0	.....	413.2
Dec.	.....	.....	271.0	.....	437.7
Total	.....	.....	2,540.4	.....	5,714.3

Iron and Steel Scrap
Bureau of Mines
(Gross tons—000 omitted)

	Consumers' Stocks		Total Consumption	
	1943	1942	1943	1942
Jan.	6,233	3,503	5,031	4,956
Feb.	6,209	3,455	4,680	4,708
Mar.	6,850	3,460	4,787	5,221
Apr.	6,918	3,582	4,642	5,156
May	.....	3,972	.....	5,225
June	.....	4,297	.....	5,000
July	.....	4,579	.....	5,006
Aug.	.....	4,780	.....	5,015
Sept.	.....	4,993	.....	4,955
Oct.	.....	5,530	.....	5,342
Nov.	.....	6,078	.....	4,930
Dec.	.....	6,274	.....	5,037
Total	.....	54,503	.....	60,551



FINANCE

	Latest Period*	Prior Week	Month Ago	Year Ago
Bank Clearings (Dun & Bradstreet, total in millions)	$8,503	$9,058	$7,769	$7,266
Federal Gross Debt (in billions of dollars)	140.7	140.1	140.0	77.4
Bond Volume, NYSE (millions of dollars)	64.0	52.4	41.8	33.1
Stock Sales, NYSE (thousands of shares)	5,279	4,672	5,736	1,417
Loans and Investments (in millions)†	$46,147	$46,965	$47,068	$31,587
United States Gov't. Obligations Held†	31,753	32,364	32,273	15,316

†Member banks, Federal Reserve System.

PRICES

STEEL's composite finished steel price average	$56.73	$56.73	$56.73	$56.73
Spot Commodity Index (Moody's, 15 items)†	245.4	244.1	246.1	232.4
Industrial Raw Materials (Bureau of Labor index)†	114.2	114.5	114.3	99.6
Manufactured Products (Bureau of Labor index)†	99.7	100.0	100.9	98.8

†1931=100; Friday seriese. ‡1926=100.

Tests Indicate Oil Consumption Can Be Cut A Third by Substituting . . . .

"COLLOIDAL" FUEL for OIL

By J. F. BARKLEY, *Chief*
And
L. R. BURDICK, *Senior Fuel Engineer*
Both of Division of Solid Fuels Utilization for War, Bureau of Mines
And
A. B. HERSBERGER
Research & Development Department, Atlantic Refining Co., Philadelphia

SHORTAGE of fuel oil caused by the war is forcing many oil-burning boiler plants to use coal. The cost of installing coal-burning equipment is frequently quite high. Operators of a number of such plants are giving much consideration to the emergency use in present equipment of mixtures of pulverized coal and fuel oil, popularly termed "colloidal fuel," a substitution that would save about one-third the oil.

Involved in this decision are questions as to procurement of the fuel, costs and operating problems.

Procurement: At present there is no commercial source of colloidal fuel. Various concerns are considering its production. Larger users could consider setting up their own grinding and mixing plants. This is now being done by at least one oil user. Studies are now being undertaken by the Bureau of Mines and the Atlantic Refining Co. to develop a low-cost mixing device. Standard pulverizing equipment now on the market will grind coal to the fineness used in the tests described here.

Costs: The question of costs is rather involved. How much can be afforded for an emergency fuel is an individual matter. Cost of equipment for complete conversion to coal may be very high. Under normal conditions in the past, the use of colloidal fuel has never proved an attractive proposition. Most oil-burning plants are in areas where under normal conditions it has been economical to burn oil.

Colloidal fuel will cost more if the expense of handling, pulverizing and mixing the coal results in a coal B.t.u. cost higher than the oil B.t.u. cost. If needed equipment is obtainable, the Atlantic Refining Co. estimates that on a production scale of 1,000,000 barrels of colloidal fuel per year this fuel could be sold in their area at about the same cost per million B.t.u.'s as that of the 16 gravity fuel oil now being delivered.

Operating Problems: To the oil-burning operator, used to the relative ease of handling and burning fuel oil, adding pulverized coal to oil is something of the nature of adding a contaminant. Properly organized operating routine is required to solve the new operating problems that arise from the changed characteristics of the fuel. Colloidal fuel is about 10 per cent heavier in weight per unit volume than oil; it is about seven or eight times as viscous; it requires more power for pumping, decreasing pump capacities; it is much more abrasive; if the coal does not stay in suspension, pastelike accumulations occur in various parts of the equipment such as tanks, heaters, and valves; the ash from the coal in the mixture is set free in the furnace.

To obtain information on the operating

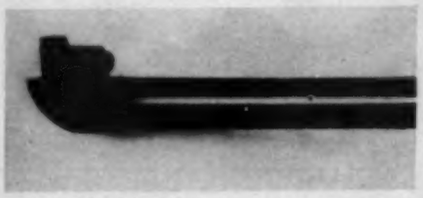


Fig. 1. (Above)—Standard steam atomizing burner used was made by Best. Fuel reaches a horizontal slot at the burner tip through the lower pipe; the steam reaches a vertical slot through the upper pipe and sweeps the fuel into the combustion chamber

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Fig. 2—Pulverized coal and oil mixing device used for batch mixing some 7000 gallons. Funnel for coal is shown on suction line from tank to pump. Discharge line from pump runs back to tank, part of which is shown here back of pump

problems involved, the Bureau of Mines, in co-operation with the Atlantic Refining Co. ran about a month's operating test on a colloidal fuel at one of the Atlantic boiler plants in Philadelphia. The test was run as part of the regular plant steam production with the usual company operators.

Fuel used was a mixture of 40 per cent pulverized bituminous coal and 60 per cent No. 6 (Bunker C) fuel oil, no "fixateur" or stabilizer being added. Previous research at the Atlantic laboratories on stabilities of mixtures showed about 40 per cent coal to be the optimum amount. The coals used were high volatile bituminous with about 37 per cent volatile and 5 to 8 per cent ash. Ash softening temperatures ranged from about 2300 to 2700 degrees Fahr. The oil had a viscosity of about 50 to 70 seconds Furol at 122 degrees Fahr. The viscosity of the mixture was about 300 to 500 seconds Furol at this temperature.

Three different batches of fuel were burned, the main difference being in the fineness of the grinding of the coal. Batches of coal were ground to pass about 88, 95 and 99 per cent through a United States standard 230-mesh screen (62 microns). This is considerably finer than that ordinarily used at plants burning pulverized coal. The Atlantic laboratory research indicated that a still finer grinding would be necessary for a colloidal fuel that would be reasonably stable.

Mixing: In general, it was found that the mixing of the coal and the oil required for the tests was less difficult than had been anticipated. A simple batch-mixing device shown in Fig. 2 was used. The fuel oil required for the batch, about 7000 gallons, was put in the plant storage tank and then pumped from the tank suction line by an ordinary reciprocating pump. Its temperature was kept at about 85 degrees Fahr. by steam coils in the tank. A funnel in the suction line, mounted on a T and valve, was kept filled with pulverized coal. See Fig. 2. Under hand-valve control, the coal was allowed to flow slowly into the stream of oil on its way to the pump. The mixture was discharged by the pump through two horizontal parallel pipes, each having an orifice near the end. The two streams of fuel met at the base of the vertical pipe, passed up and back into the storage tank.

The fuel was spilled into the tank at two outlets, one at each end of the tank. The coal was fed into the oil at the rate of about 1500 pounds per hour, the fuel being continually circulated at the rate of about 9000 gallons per hour.

After the required amount of coal was fed for the batch, the fuel was circulated for about 12 hours. Laboratory tests of samples of fuel taken at various places throughout the tank showed the mixture to be uniform. No further recirculating of the fuel was done during the burning tests at the boiler plant, the mixing device being valved off from the suction line.

Boiler Equipment: Typical boiler-plant equipment was used. The suction line from the outside oil storage tank ran underground about 100 feet to the heater-pump set, Fig. 3. A steam line that helped maintain fuel temperatures to the pump paralleled the oil suction line. One pump was a reciprocating and one was a rotary. The fuel was heated to temperatures between 160 and 180 degrees Fahr. at the set and pumped about 110 feet to the boiler.

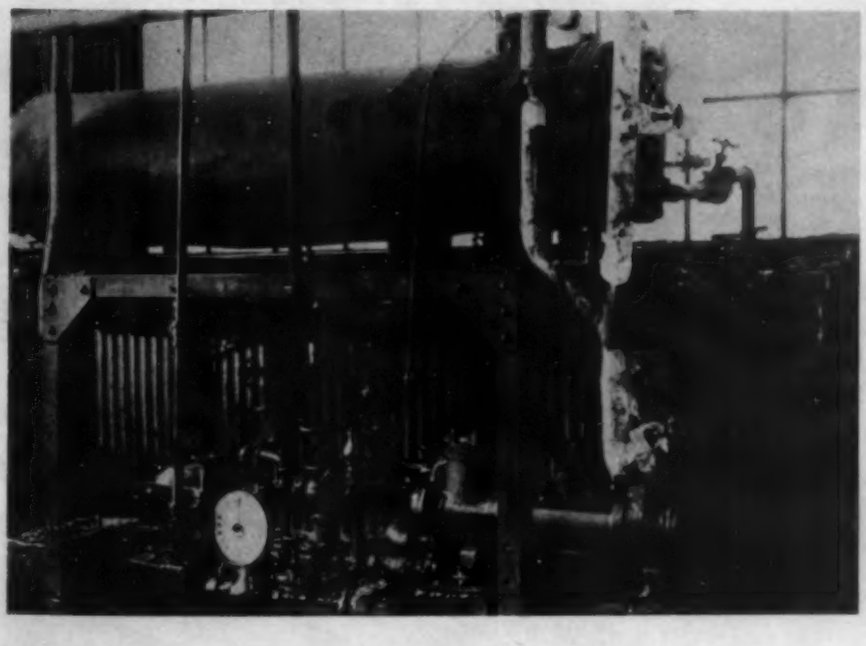
The burner used was a standard Best steam atomizing type, shown in Fig. 1. The fuel reaches a horizontal slot at the burner tip through the lower pipe; the steam reaches a vertical slot through the upper pipe and sweeps the fuel into the furnaces. The fuel and steam were under hand control.

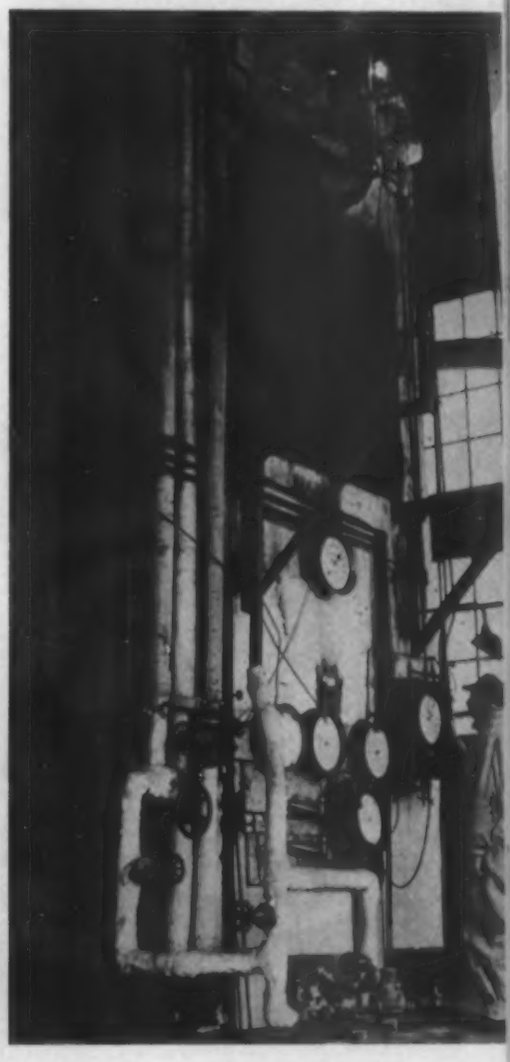
The boiler was a 151-horsepower long-drum straight water-tube B & W 8 tubes wide and 9 tubes high. Fig. 4 shows the boiler front. The furnace was a typical brick set furnace, 10 feet high at the front from the floor to the tubes and 6 feet high at the rear. The furnace width was 5 feet and its length 15 feet, giving a furnace of about 600 cubic feet. The burner entered the furnace at the rear under a horizontal baffle extending about halfway the length of the tubes resting on the first row. The gases crossed through the tubes upward at the front

(*Please turn to Page* 137)

Fig. 3 (Below)—Heater pump set and connections used on the tests at Atlantic Refining plant

Fig. 4. (Right)—View of front of the 151-horsepower long-drum straight water-tube boiler made by Babcock & Wilcox





Lower left—This plane is about to "get it" as he comes into the gunner's sight. In training, photos like this are taken to supplement actual firing as an aid to improving accuracy
Upper left—Firing at rapidly towed targets is also part of gunner's training. All photos from U. S. Army Air Force
Above—Retractible turret near tail of this Douglas B-18 A carries a Browning machine gun

MORE FIRE POWER

for our fighting aircraft

OF ALL the aeronautical and military technical terms handled so glibly by columnists and commentators, perhaps none has been so much misunderstood or so poorly evaluated as "fire power".

Our military planes must possess a whole complement of highly jacked-up characteristics if they are to show superiority over enemy aircraft. They must conceivably have great level flying speed, high rate of climb, high ceiling, excellent maneuverability. But without fire power, the best plane in the world can be at the mercy of an inferior enemy craft with a single machine gun.

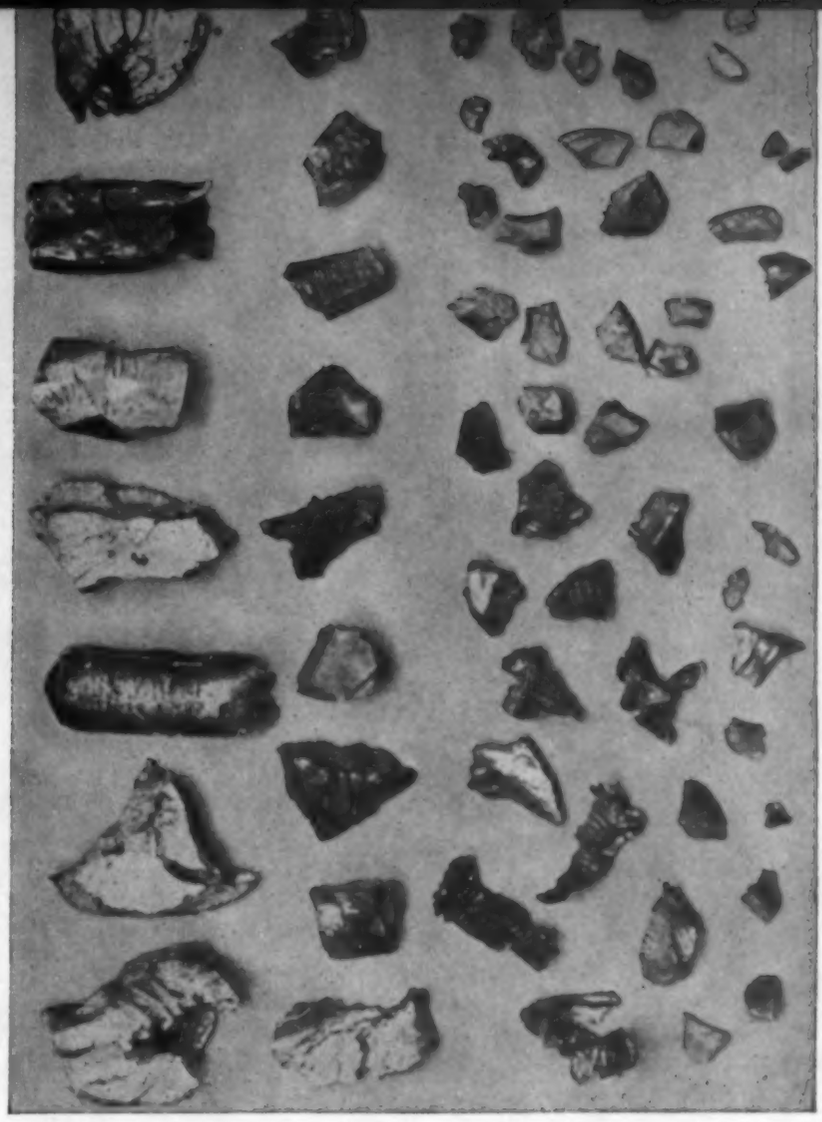
Much has been learned about the effect of various aircraft weapons in combat use. Much was known long before this present war started. Air action over Spain was taken to heart by many foreign nations, fortunately the British were the best students, and we may never know what we owe to the R.A.F. for their magnificent showing during the air blitzes over Britain. Heavily machine gunned Spitfires and Hurricanes did the trick then.

Today, with so many types of bombers and fighters in action, more radical means are indicated, more machine guns, more cannon, and new combat teamwork techniques.

British Spitfires and Hurricanes carried eight .30-caliber machine guns in their wings, four on each side. How did these fast flying, fast fighting pursuits manage to down enough Germans with machine gun fire, whereas the Germans had both machine guns and cannon on their own planes?

The Answer Is Fire Power

Fire power is measured in terms of amount of ammunition, of weight of ammunition that can be shot from a single gun or from all the guns on a plane within a specified period of time. R.A.F. fighters of two years ago could pump out bullets at the rate of 1100 per gun per minute. Multiplied by eight, this means 8800 rounds per minute.



Right—Illustration shows splinters (actual size) from a Madsen 20-millimeter gun's 146-gram armor piercing tracer bullet when fired through a piece of armor plate (1-inch thick and testing 490 brinell) when placed 600 yards from gun. Splinters concentrated in area 18 inches in diameter 1 yard back of plate. Devastating effect can easily be imagined

By LOUIS BRUCHISS
Ordnance & Aircraft Engineer
New York

Each round weighs about 0.025 pound. Multiplied by 8800 this means 220 pounds of machine gun fire per minute.

Of course, no plane is ever able to maintain constant fire at an enemy plane for such a long period. A few seconds, at the utmost, is the longest period during which sighting, aiming and firing can take place. Within this time, enemy craft will maneuvre out of position, and a new offensive run must be taken, if possible. Total weight of fire is given only for comparison. The above performance was accomplished by the Hurricane I and the Spitfire IIa. The Hurricane IIb was equipped with twelve .30-caliber machine guns with a total firing rate of 13,200 rounds and a total fire weight of 330 pounds per minute.

Compare this with the German Messerschmitt Me 109F 1 and 2 which carried two .30-caliber machine guns and one 20-millimeter cannon each. The machine guns had a 700-round per minute firing rate, totaling 1400 rounds or a weight of 40 pounds per minute. The cannon-fired shells weighing ¼-pound or a total weight of about 225 pounds per minute (attained through a cannon firing rate of 900 rounds per minute with the Mauser cannon, fastest firing in the world).

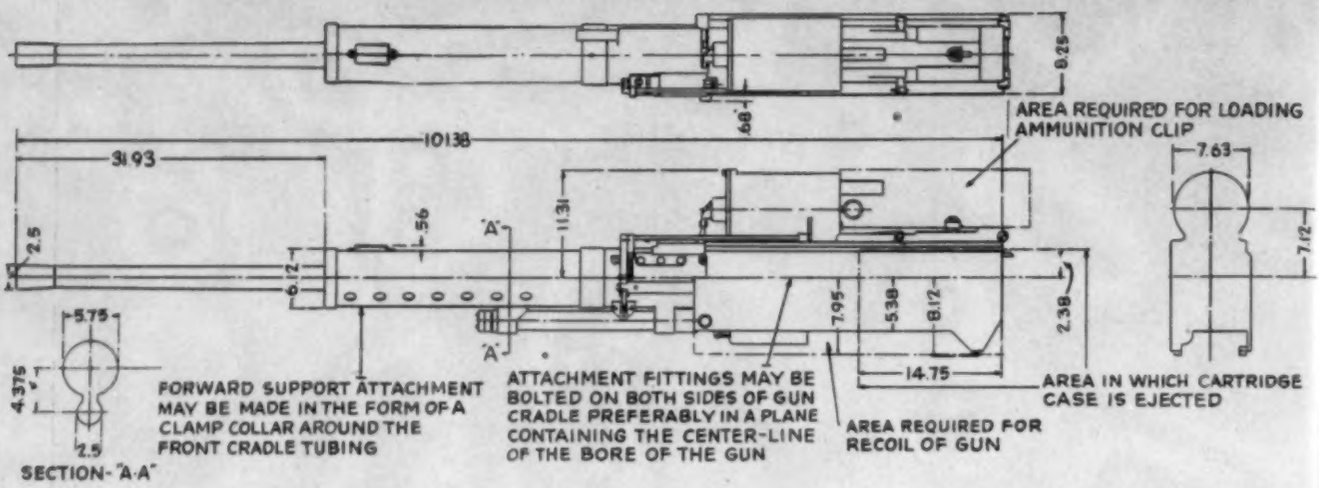
Total weight was still only 265 pounds against the British 220 pounds. These were for fighters and do not forget that the British for the most part shot down bombers which did not have fixed guns as do all fighters. The .30-caliber flexible guns of the German bombers were not up to the concentrated fury of the British fire, backed by more flexible planes and high speed.

The British rapidly adapted the fighting twins, the Spitfire Vb and Hurricane IIc, equipping the first with four .30-caliber machine guns and two Hispano Oerlikon cannon of 20-millimeter, and the latter with four 20-millimeter cannon. The cannon have a firing rate of 600 rounds per minute, giving the Spitfire a total fire weight per minute of 410 pounds and the Hurricane a total of 600 pounds. This is exceeded only in the Beaufighter I, which has six machine guns and four cannon with a total fire weight of 765 pounds per minute.

It is readily evident that fighter planes cannot carry unlimited ammunition. A few minutes maintained fire would necessitate tons of ammunition which they cannot carry. Machine guns were desirable because they were comparatively reliable, had a very high firing rate, even if this did not result in high total fire weight. The point is that a high firing rate assures some hits being scored, while a lower firing rate, as with cannon, may mean higher fire weight, but fire weight does not mean anything if it does not reach the enemy plane. Therefore the compromise between machine guns and cannon in the Spitfire and Beaufighter.

The Hurricane IIc has dispensed with machine guns altogether, giving all of its space to the four 20-millimeter cannon and ammunition. With a total firing rate of 2400 rounds per minute, this is not too bad. But reduced to seconds, this means only 40 rounds per second, not too wonderful, by the way, when an enemy craft may be passing you at a relative speed of 800 miles per hour!

In the first World war, the French tried out several installations of 37-millimeter cannon mounted on the engine to fire through a hollow propeller hub. The 1½-inch shell thrown out from this cannon did havoc to planes. One direct hit with it definitely brought a plane down, and even today practically no fighter can survive a direct hit with it,


AREA REQUIRED FOR LOADING AMMUNITION CLIP
FORWARD SUPPORT ATTACHMENT MAY BE MADE IN THE FORM OF A CLAMP COLLAR AROUND THE FRONT CRADLE TUBING
ATTACHMENT FITTINGS MAY BE BOLTED ON BOTH SIDES OF GUN CRADLE PREFERABLY IN A PLANE CONTAINING THE CENTER-LINE OF THE BORE OF THE GUN
AREA REQUIRED FOR RECOIL OF GUN
AREA IN WHICH CARTRIDGE CASE IS EJECTED
SECTION-"A-A"

A typical 37-millimeter aircraft cannon design

and most bombers will suffer heavy damage.

Several French and at least one American flyer, Captain George Prince, tried out this lethal installation with some success. Its use was discontinued, most likely because of the weight of the cannon and its ammunition, the terrific recoil it must have had, and probably because accuracy and definite results were not always forthcoming. The plane equipped with the 37-millimeter may have had no other weapons and it is possible that enemy fighters would bank around and riddle the cannon plane with machine gun fire.

Today, the 37-millimeter automatic cannon is standard equipment for the Bell P-39, together with two .30-caliber and four .50-caliber machine guns. The British, favoring the 20-millimeter, have installed a 20-millimeter in the Bell, allowing them to obtain a higher firing rate and the use of more ammunition. The Lockheed Lightning P-38 also uses a 37-millimeter cannon together with a number of machine guns in the nose of its twin engined structure.

The Germans long ago had 20-millimeter cannon firing from the nose of the Messerschmitt. Now the Focke Wolf 190 has four 20-millimeter cannon in the wings, divided into two makes, the Mauser and the Oerlikon, one Mauser and one Oerlikon to each side.

There had been much discussion on the efficacy of 20-millimeter shells of both armor piercing and explosive type. Our military armament men have held that .50-caliber machine guns, if enough could be supplied per plane, were sufficient. In installations where really devastating power was desired, the 37-millimeter was indicated. A prominent naval armament officer, Commander W. F. Boone, has stated that experiments showed a .60-caliber to be the optimum aircraft gun size.

In an article written a little more than a year ago Commander Boone stated that if curves were plotted representing all the factors which entered into the decision of choice of gun caliber for the fixed gun battery of a fighter plane, these curves would converge around the .60-caliber point, which means that a gun slightly larger than our .50-caliber was the optimum size.

This, however, was a year ago. Commander Boone hastened to add that the aircraft armament picture was changing constantly, with a continued race on between armor plate on the one hand and larger caliber guns on the other. Actually, armament experts see no limit to the size of the guns nor the thickness of armor plate which military aircraft of the future may carry.

Fire Power Measured in Seconds

Another important point, especially in regards defensive tactics, revolves about the location of the guns. If all are fixed to fire forward, the plane may easily be vulnerable to enemy craft from the rear. Similarly heavy bombers need fire power in the "belly" to prevent leaving a vulnerable point there.

Now while "fire power" may be the amount of metal that can be thrown at a target within a given time interval, it is also true that a plane having very heavy fire power may be inferior in an armament sense to another plane having lower fire power, but having a different setup of fixed or flexible guns. A plane carrying only 37-millimeter cannon for example, might have great fire power when measured per minute, but ultimately the test of fire power is measured in seconds. This means that the best offensive or defensive guns a plane can carry must have a high cyclic rate, and that if it mounts large caliber guns, they must be supplemented by a number of smaller caliber ones. In other words, there should be diversification of gun sizes.

On the other hand, there is a source of worry in the fact that while we expect to fly our heavy bombers through to vital enemy inland targets and have them come back to their bases, though attacked and hit by enemy planes carrying 20-millimeter cannon, how will our fighters without such cannon fare against enemy bombers?

This problem is being solved by arranging for 37-millimeter cannon on our planes; by assuring that our bombers carry more armament in more positions than the enemy. This is being done by arranging for improved types of machine gun and cannon ammunition which carry farther. When the range increases it does not follow that the plane mounting the guns will make full use of this maximum range, but it does mean that the trajectory will be flatter and that more accurate firing will result.

There are other developments which have to do with actual fire control of the large guns to be mounted on our fighters and bombers, and with new types of weapons which will materially reduce if not eliminate the enormous recoil of the present aircraft cannon. With these new weapons at our command, our superiority over the enemy.

Fire power may be further broken down into type and size of ammunition fired from a plane. A fighter with an offensive fire power of 765 pounds per minute as the Beaufighter I will throw 12¾ pounds of metal per second against the enemy. If this weight is composed entirely of .30-caliber bullets, they may conceivably all hit the target without damaging it fatally, because each individual bullet would have low striking power and their total effect would be spread over wide sections of the target. If, however, two to four 37-millimeter shells with a total weight of much less than 12 pounds hit the target the result may be materially different. If one 3-inch shell could be lobbed at the enemy,

(*Please turn to Page* 139)

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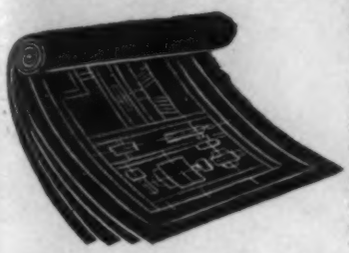

. . . Your engineers can use this information to take advantage of the high strength-weight ratio, corrosion resistance, wear resistance and permanence of Carpenter Stainless Steel. Of course, all Carpenter Stainless Steels could not be shown on a table of this size, so if you would like more information on the working properties of the various grades—or additional technical data—get in touch with us. Your nearby Carpenter representative will be glad to keep you in close touch with our Metallurgical Department, and supply helpful fabricating data.

TYPE OF PRODUCT	Carpenter Stainless Used and Analysis	Properties Provided by Stainless Grade—for a range of applications	RANGE OF PHYSICAL PROPERTIES*					OTHER RECOMMENDED USES
			TENSILE STRENGTH lbs. per sq. inch MAX./MIN.	HARDNESS MAX./MIN.	SPECIFIC GRAVITY	SCALING TEMPERATURE (Max. for continuous service)	IS IT MAGNETIC?	
SCREWS BOLTS RIVETS	**No. 1** (Type 410) C. .10 Cr. 13.00	This stainless provides fair machining and good cold heading properties. It contains just enough chromium to yield truly "stainless" properties. It resists the corrosive effects of fresh water, gasoline, crude oil, alcohol, ammonia, etc.	190,000 / 80,000	Brinell 387 / 179	7.78	1200° F	Yes	Carpenter Stainless No. 1 is also used for springs, valve trim, pump shafts, and many heat treated parts. Available in forging billets, bars, wire, and strip.
COMBUSTION ENGINE PARTS	**No. 2** (Type 420) C. .30 Cr. 13.00	Where extra hard stainless is needed for wear resistance, this grade is excellent. It is used for tempered parts that must be harder and stronger than parts made from No. 1. Its corrosion-resisting qualities are similar to those of No. 1.	260,000 / 90,000	Rockwell C 52 / 196 Brinell	7.75	1200° F	Yes	Used only in fully hardened condition for surgical and dental instruments, ball bearings, gears, shafts, cams, ball check valves, etc. Available in same forms as Carpenter Stainless No. 1.
CHEMICAL PROCESS EQUIPMENT	**No. 3** (Type 442) C. .15 Cr. 20.00 Cu. 1.00	This stainless is easy to form, bend, blank or punch. In addition to providing corrosion resistance to salt water, practically all organic chemicals and acids, it has excellent heat resistance properties.	125,000 / 90,000	Rockwell C 28 / 187 Brinell	7.69	1600° F	Yes	No. 3 does not become embrittled by grain growth at high temperature—used for scale resisting purposes. Furnace parts, soot blowers, ladles for molten non-ferrous metal, etc. are made from it. Available in bars, forging billets, strip, wire and welded tubing.
OIL FIELD EQUIPMENT	**No. 4** (Type 302) C. .10 Cr. 18.00 Ni. 8.00	This tough and ductile stainless responds easily to deep-drawing, blanking and forging. It has all the corrosion resistance of No. 1 and No. 3, plus resistance to dyes, foodstuffs, most organic chemicals and a wide variety of inorganic chemicals.	225,000 / 85,000	Rockwell C 43 / 160 Brinell	7.93	1600° F	No	Used extensively in form of cold rolled strip for stampings, springs, etc.—and in the form of wire for woven screens, dipping baskets, etc. Available in bars, forging billets, strip and wire.
INSTRUMENT PARTS	**No. 5** (Type 416) C. .10 Cr. 13.50 S. .30	No. 5 machines in automatic screw machines about like SAE 1120. Cutting speeds between 125 and 200 surface feet per minute are common. This stainless resists the corrosive action of mercury, steam, crude oil, sugar solutions, mine water, etc.	164,000 / 80,000	Brinell 351 / 187	7.77	1200° F	Yes	A Free-Machining grade for parts made on automatic screw machines or machined from forgings—such as valve trim, pump shafts, hexagons for nuts, capscrews, and other hexagonal parts. Available in forging billets, bars and wire.
MOLDING and TRIM	**No. 6** (Type 430) C. .10 Cr. 17.00	This stainless is extremely ductile for forming, drawing and stamping and lends itself readily to complicated press work. No. 6 resists the same corrosive elements as Carpenter Stainless No. 1—but with a greater factor of safety.	125,000 / 70,000	Rockwell C 25 / 150 Brinell	7.71	1300° F	Yes	Used in the form of cold rolled strip for making stampings, etc. In the form of cold drawn wire for woven screens, screws, bolts, rivets, and other cold headed products. Available in bars, forging billets, strip and wire.
SCREW MACHINE PARTS	**No. 8** (Type 303) C. .10 Cr. 18.00 Ni. 8.00 Se. .25	When machining is involved, this stainless is generally used instead of No. 4. This type provides the same general corrosion resistance properties, and is Free-Machining.	150,000 / 85,000	Rockwell C 35 / 160 Brinell	7.93	1600° F	No	A Free-Machining grade for use in automatic screw machines or forgings to be machined. Recommended for parts requiring greater corrosion resistance than Carpenter Stainless No. 5. Available in same forms as No. 6.

*NOTE: Physical properties depend upon form, heat treatment or cold working. Slightly wider ranges of properties are possible in certain forms. Take up your special problems with our Metallurgical Department.

For further design-engineering and fabricating information, ask for a copy of "Working Data for Carpenter Stainless Steels". This 98-page book is made available to help you select the best Stainless for today's or tomorrow's products. A note on your company letterhead will start your copy on its way. Drop us a line today.

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***Carpenter* STAINLESS STEELS**

A group of small tools suited to nitriding in a salt bath

NITRIDING TOOLS

In Liquid Salt Baths

By G. W. ESAU
E. F. Houghton & Co.
Philadelphia

NITRIDING—the production of a superficial hard case on heat-treated high-speed-steel tools—has been studied by manufacturers of salt bath materials as a research project for developing a liquid salt nitriding bath that will assure uniform and controllable results. As a result of the project, an effective salt bath for the nitriding operation was developed and has been utilized for several years. In the creation of the successful product, the reason for the erratic results obtained from the mixtures of potassium and sodium cyanides used in earlier practice was incidentally disclosed.

Research revealed that the objectionable feature of the earlier mixtures—the formation of carbides—was at a definite ratio with the depreciation of the cyanide, and at the same time explained the soft skin which often resulted.

It was definitely proven that any appreciable formation of carbon produces the soft skin. Actual carburization of the surface of high-speed steel in former nitride casing was responsible for a result which many heat treaters had believed due to decarburization in the preceding heat treatment.

When the potassium and sodium cyanides mixture was fresh and unimpaired, the case would be practically all nitride, with little or no carbide. With continued cyanide depletion, however, the nitride diminished and carbide formation increased, with carbide percentage at times greater than the nitride.

A modern liquid salt bath for nitriding has a melting point of 920 degrees Fahr. with an operating range of 1000 to 1200 degrees Fahr. to select an example. It is a cyanide base bath, to which other materials have been added to control the rate of cyanide decomposition, to control the rate of nitride absorption, and to inhibit the absorption of carbon or carbides.

Stable and uniform results are obtained from this balance of factors. The addition of fresh salts to replace drag-out losses will usually maintain bath efficiency. If there is little drag-out loss, the bath can be bailed out periodically by 5 to 10 per cent and replacement made with fresh salts. Conventional salt-bath equipment is used. Pressed steel pots give exceptionally long pot life at the low temperature involved.

The temperature must be closely controlled to avoid exceeding the final tempering temperature which, with finish grind, precedes the nitriding bath. The risk to be avoided is the production of a soft core of the original high-speed analysis under the case.

Usual temperature of the nitriding temperature is either at, or slightly below, final tempering temperature—generally in the range 1025 to 1050 degrees Fahr. Extremely fragile tools are treated in the range 950 to 1000 degrees Fahr. Time of treatment varies from 10 to 90 minutes.

Tools subject to considerable chatter or shock, especially those used on ferrous materials, are treated for shorter periods for best results, whereas longer treatment is of advantage in nitriding tools for nonferrous metals and plastics. Temperatures would be the same in both ranges, depending upon the other variables and the tempering temperature which was utilized.

An extremely heavy case should be avoided. A heavier case will yield more pieces of work between grinds, but the possible number of grinds per total tool life might be decreased, due to deeper chipping when the tool does fail.

The usual depth of the nitride penetration is from 0.001 to 0.002-inch for treatments of 30 to 90 minutes, and below 0.001-inch for treatments of 10 to 20 minutes. The superficial case is extremely hard and cannot be measured by ordinary hardness methods, but must be determined by scratch test or Vickers hardness readings.

At 1050 degrees Fahr., 30 minutes immersion, a penetration of 0.0013-inch averaged 937 brinell; at 60 minutes, penetration of 0.0017-inch averaged 1026 brinell; at 90 minutes, penetration of 0.0019-inch averaged 1065 brinell. These readings were determined by Vickers and transposed to brinell figures. These brinells may be slightly low, as even the Vickers may be recording some of the hardness of the true high-speed-steel backing and not the true abrasive hardness of the nitride case, where the case is so thin.

The high-speed steel manufacturer has gone to great pains to determine the ideal analysis and eutectics of the alloys in his steels to give the greatest hardness and performance when properly hardened, therefore any additions to or subtractions from these elements are not usually beneficial. So the heat treater should be very careful not to alter the outside analysis in his work unless it is by an approved process. Nitriding does add a certain extreme

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PITTSBURGH PENNSYLVANIA

Typical salt-bath unit for nitriding tools

abrasive hardness to the outer skin without penetrating to any great depth, and thereby not altering the ductility of the entire tool. Carburization of the 18-4-1 tungsten type and decarburization of the "moly" type do produce soft skins to a depth which cannot be corrected.

The nitriding treatment does not increase the size of the tool, when tempering has been completely effected. Many tests and measurements have determined that variations in size between proper tempering operation and nitriding in the liquid salt fall within 0.0001-inch. Any greater variation would not be due to the nitriding action, but is caused by undue transformation of austenite to martensite, which is induced by improper heat treatment and draw prior to nitriding.

The ideal condition for high-speed steel, after hardening, is the austenitic state in which most of the tungsten and chromium carbides are absorbed in solid solution. This austenitic state is then drawn at 1050 to 1150 degrees Fahr. so that it slightly approaches the martensitic.

It is essential that tools be correctly heat treated before nitriding, with no carburized or decarburized layers. Of the two, a slightly decarburized layer would be preferable, as the addition of nitrides to the surface of the steel will tend to neutralize the soft skin produced by decarburization. When soft skin is caused by over-carburization, the addition of nitrides to the surface layer will have substantially less effect in producing the desired superficial hard case. A super-saturation of elements above that put in by the tool steel manufacturer does not usually add to the qualities of an already high-alloy high-speed steel, so care must be used with any atmosphere which will add to or subtract from these elements.

Complete salt-bath treatment throughout eliminates these variables. The present salt-bath materials are easily controlled, so that any type of high-speed steel, including the molybdenum types which are prone to decarburization, can be heat treated without carburization or decarburization. This complete salt-bath treatment of high-speed steel tools is gradually replacing the "controlled atmosphere" method.

The increase in tool life resulting from the salt-bath nitriding treatment when applied to correctly heat-treated tools is phenomenal. There are many cases where tool life has been increased by 200 to 300 per cent, and in some instances to as high as 500 per cent.

Cost Is Very Low

The expense of the salt-bath treatment in heat treating and nitriding high-speed steel tools is extremely low, and should be eliminated as a factor when compared to the actual savings accruing from increased tool life and greater production between regrinding operations.

Another important point contributing to ultimate production figures is the cutting oil. Efficacy here is not a matter of sulphur content only, but how that sulphur is "wrapped up." As the high-speed steel manufacturer has carefully wrapped up all his alloys into an ideal eutectic combination or analysis, so also the fats, the chlorines and the sulphurs must be efficiently combined to release what is necessary at the tip of that tool and on the chip.

The treatment of high-speed tools is most important today. Formerly any fair treatment gave good results. Now, since we are trying to get the optimum out of every tool, we dig deeper into our former failures, thereby discovering errors and improvements in methods of procedure. The time out for tool changes and fresh setups was formerly regarded as of little importance. Now we watch pieces per grind and total pieces per tool—all to keep machines constantly in motion and to save high-alloy steels.

Saves Enough Copper To String 25,000 Miles of Wire

More than 4,400,000 pounds of copper or enough to make 70,500,000 30-caliber cartridge cases or more than 25,000 miles of No. 12 telephone wire, it is estimated, will be saved by Sloan Valve Co., Chicago, in manufacturing a redesigned toilet flush valve. According to the company, the net copper content of the valve was reduced from approximately 6 pounds to less than 4 ounces.

The savings resulted from substituting various plastics and malleable iron for the more critical brass used in the component parts of the unit.

The new valve, called the "victory", is the result of collaboration between Sloan engineers and the Chicago Molded Products Co.

Body of the flush valve presented the best opportunity to conserve copper, now being of malleable iron. A plastic lining is incorporated in the body.

Synthetic Sponge Rubber Stays Soft at 40° Below

A synthetic rubber sponge which will stay soft and compressible at 40 degrees Fahr. below zero was recently developed by B. F. Goodrich Co., Akron, O. Of medium density, it is black in color, and can be furnished in slabs or molded shapes.

Flex-Abrasive Offers New Line of Metal Removers

A new line of self-dressing, flexible abrasive wheels and points for deburring exterior edges and finishing irregular surfaces, ordinarily hard to reach, such as holes, openings and corners is announced by Flex-Abrasive Co., 100 North Lasalle street, Chicago.

Metal removers in the line are made in different types and sizes for use on hard alloy steels or other materials.

Mandrels are of tapered thread construction, firmly locking the abrasive wheel or point to the shaft by its rotary motion. According to the company, an inexperienced operator can remove or replace a wheel or point from the mandrel quickly without use of tools.

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SPOT WELDING ALUMINUM

Why is spot welding of aluminum in aircraft desirable; and if it is desirable, why is it not employed more widely? What is the best type of welding equipment? What are the relationships between time, power, pressure and tip diameter? Is there an "ideal" electrode material? How about refrigerating the tips?

(This is No. 2 in a Series on Metallurgy of Resistance Welding)

By HAROLD LAWRENCE
Metallurgist and Welding Engineer

EVER SINCE recognition of the importance of airpower in modern warfare, the use of welding for aluminum fabrication has seen intensive development.

Although both gas and arc welding of aluminum were well established arts, there was much to be learned about spot welding the aluminum alloys.

As usually happens under the stress of wartime research, the scientific knowledge of the many factors contributing to consistently good spot welding of aluminum materials has progressed so rapidly that metallurgical factors have been advanced further than engineering applications.

Spot welding quite generally is restricted by aircraft designers to secondary structures—parts whose failure would not seriously affect the performance of the airplane. Riveting remains standard practice in by far the majority of primary structure designs, notwithstanding the obvious advantages afforded by spot welding.

With manhours of labor at a premium, the savings in labor introduced by spot welding become most important. For example a flush riveted panel comprising a sheet 24 x 60 inches and five angle stiffeners requires 88.3 man minutes whereas the same panel may be spot welded in 32.8 man minutes. Or take another skin-stiffener assembly where riveting consumes 32.1 man minutes per unit while the spot welded assembly time is but 13.5 man minutes. In these two typical examples welding takes less than half the time required for a first class riveting job.

Streamlining aircraft structures for aerodynamic reasons has been practiced for some years. Projecting rivet heads introduce resistance due to drag. Power to carry the aircraft at top speed is thereby increased. Or if the power is held constant, a smooth rather than a rough surface will lead to greater speed. Of course a smooth surface may be achieved by flush riveting although the cost is high and the time consumed far out of line compared with welding.

Rivets Allow Flexibility

Why then, if the advantages of spot welded construction have not been overstated, have designers been reluctant to specify this type of construction? The reasons are twofold. First, the riveted structure is more flexible with enough play in the entire structure to allow, presumably, each rivet to assume its share of the total load. Spot welds being more rigid cannot yield to permit even stress distribution unless they possess considerable ductility.

Second, perfection in the structure of spot welds, metallurgically speaking, is not attained 100 per cent of the time. Cracks and structural inhomogeneities are discovered from time to time and it is feared that these imperfections detract

Fig. 1—Electrical characteristics of three basic types of machines for spot welding aluminum including standard alternating-current spot welder, electromagnetic stored-energy equipment and electrostatic stored-energy systems

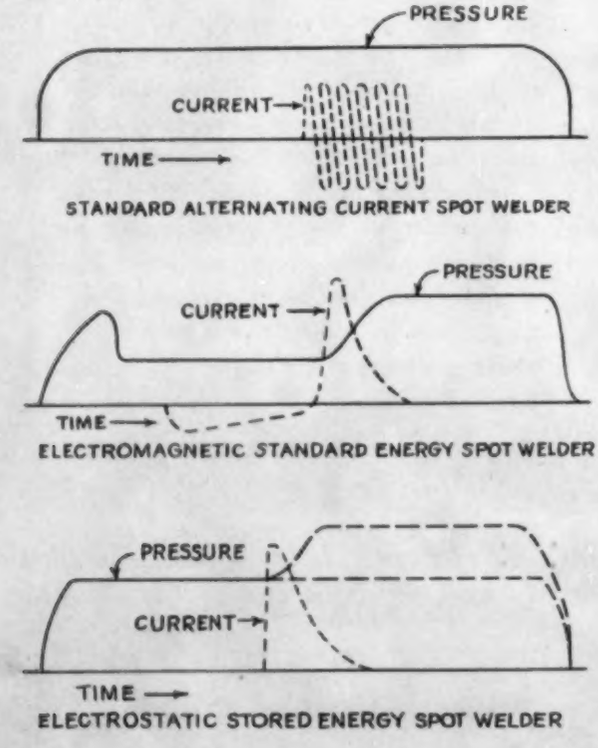

TABLE I—Machine Settings for Alternating-Current Spot Welding of Aluminum Alloys

B. & S. No.	Gage Inch	Time, Cycles	Current, Amperes	Tip pressure, lb. Min.	Max.
26	0.016	4	14,000	200	400
24	0.020	6	16,000	300	500
22	0.025	6	17,000	300	500
20	0.032	8	18,000	400	600
18	0.040	8	20,000	400	600
16	0.051	10	22,000	500	700
14	0.064	10	24,000	500	700
12	0.081	12	28,000	600	800
10	0.102	12	32,000	800	1,000
8	0.128	15	35,000	800	1,200

TABLE II—Typical KVA Demand on 60-Cycle Single-Phase A-C Aluminum Welding Machines

Aluminum Gage	12 in.	18 in.	24 in.	30 in.	36 in.
0.020	50	60	70	80	90
0.040	75	80	95	110	130
0.060	100	125	140	150	190
0.080	150	160	190	210	250
0.125	200	250	300	350	400

TABLE III—Typical KVA Demand of Stored Energy Aluminum Welding Machines

Aluminum Gage	Operating Speed Spots per minute	Kva Demand
0.020	110	40
0.035	90	40
0.060	70	50
0.080	50	50
0.125	20	70

DOALL

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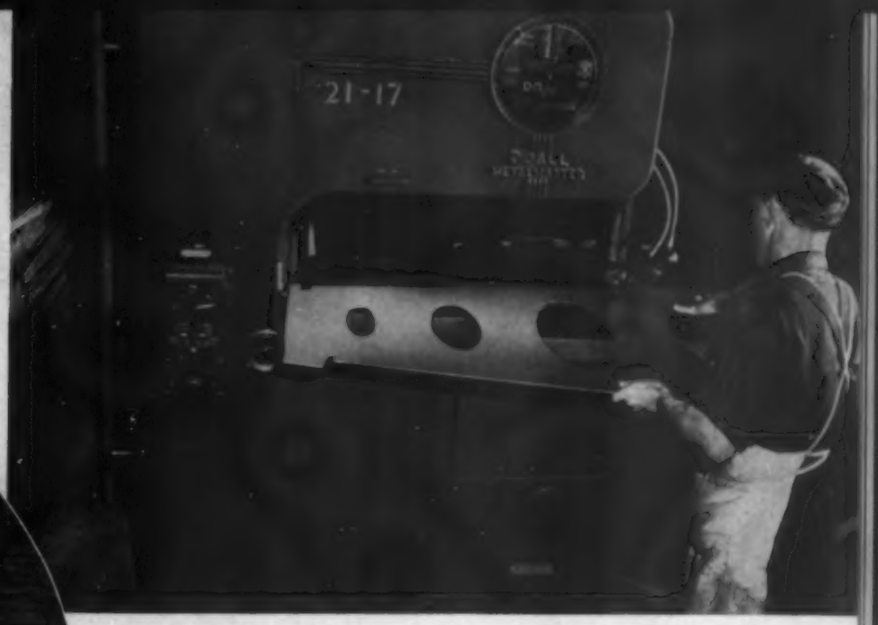

At the Fort Worth home of B-24 Liberator Bombers and C-87 Liberator Express Transports. At left, Operator Jackson is making a bucking bar from a pattern drawn on a block of cold rolled steel. Above, he is cutting sheet aluminum. This is only one of many DoAlls in this modern plant. Jackson has been operating this machine for more than eight months and declares it is invaluable because of its fast precision cutting and the fact that it saves both time and metal.

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- ★ DoAll does internal and external cutting of metals, alloys, plastics, etc. following a hairline design with unerring precision.
- ★ Cuts out production parts, jigs, dies, fixtures, cams, templates, special tools, etc.
- ★ Cuts out 100 or more shapes at one time from stacked sheets.
- ★ Makes short runs of stampings or forgings.
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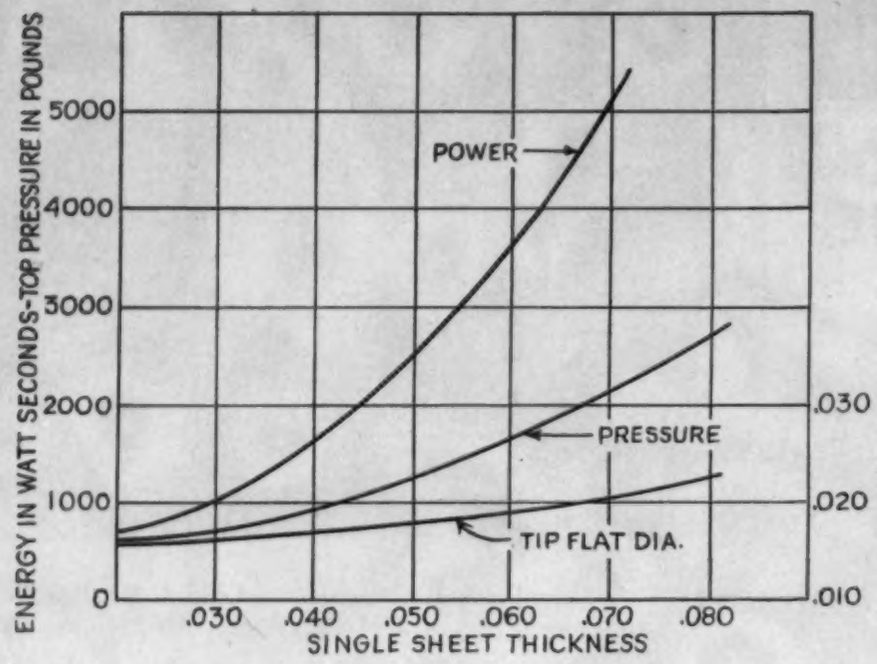

Fig. 2 — Stored-energy machine settings for spot welding 24 ST Alclad material

from the satisfactory performance of welded structures.

All welding progress has been made as a result of time consuming tests that have gradually pushed back the frontier of ignorance. Similarly extensive testing programs are now under way to prove to the skeptics (and when the importance of safety is realized, the skeptics have their points) that adequately designed welded structures containing good, although not necessarily perfect, spot welds will mean more and better aircraft with a fixed number of expendable manhours of labor.

Since by far the greatest amount of spot welding is done in the aircraft industry, this discussion will center about the problems of that particular field. However, the uses of resistance welding in joining the aluminum alloys in other industries will not differ appreciably from aircraft fabricating practices. While most of this article will consider spot welding, it must be understood that the same factors will be encountered in seam welding which may be considered to be nothing but spot welding with the spots spaced as close together that they overlap.

Both spot and seam welding of the aluminum alloys is accomplished by three fundamental types of equipment—alternating current, magnetic energy storage and condenser energy storage. Fig. 1 illustrates the simple pressure, current and time relationships possessed by each of these welding units.

As was pointed out in an earlier article on spot welding of steel (see "Metallurgy of Spot Welding", STEEL, March 29, 1943, p. 100), the heat generated in a spot weld is proportional to I^2RT where I is the current, R is the resistance and T is the time. These relationships make spot welding under a fairly wide group of conditions relatively simple in welding steel with its rather wide plastic range. With aluminum, though, the problem is somewhat more complex.

Aluminum has a high heat conductivity and low resistance which means that the weld must be made quickly if the heat losses are not to be excessive. The answer lies in high weld currents and short weld cycles together with precise pressure control tuned to the comparatively narrow plastic ranges of aluminum alloys. Heat input must be so rapid that little heat can escape from the weld nugget during the time of the weld.

Of course the use of high currents with alternating-current spot welding machines results in a heavy power demand on that single phase of the power line that energizes the primary of the welding transformer. Along with this heavy demand are the detrimental influences, from the point of view of efficient use of power, of a low lagging power factor together with a low load factor. Of course these problems can be solved with additional electrical equipment but the trend has been away from the alternating current types of welders to the stored energy varieties which possess more favorable power characteristics.

In alternating-current welding, the welding current is obtained from the secondary coil of a welding transformer having a turn ratio of from 20:1 to 100:1. Either 220 or 440-volt 60-cycle power is used to energize the primary coil. And electronic tubes are generally selected to control the time of welding.

The welding current required is a function of the thickness of the material to be welded. Current is adjusted in steps of about 1000 amperes by means of taps on the primary of the transformer or through a separate auto-transformer.

Frequently delayed ignition of the electronic timer tubes is arranged so as to change the wave shape of the welding current. This method may be utilized to reduce the current to about 50 per cent of maximum while a series-parallel switch may be provided on the welding transformer primary to permit a reduction in current to 25 per cent of maximum. Such arrangements permit normal ranges of material thicknesses to be covered adequately.

Although the welding pressure may be applied by mechanical means, compressed air operation is most popular because a compressed air supply is readily available in most plants.

Because of the rapid softening of aluminum at welding temperatures, a slight movement of the welding electrode into the material being welded is desirable. Although the movement is small, it must take place very rapidly —in about 0.002 to 0.005-second. For this reason a moving electrode system possessing low inertia and virtually frictionless is necessary to keep the electrodes and the material being welded in positive contact.

Both magnetically and mechanically operated welding contractors have been used as switches in the supply line of the welding transformer primary in order to control the welding times. An accuracy of plus or minus one cycle is necessary. Furthermore, it is desirable that welding timers be adjustable to operate to close the circuit at a definite point in the voltage wave and to open the circuit when the welding current passes through zero.

Many alternating-current welders are equipped with electronic controls to regulate the duration of the welding current. Uniform weld appearance and improved spot consistency are obtained when electronic controls start the flow of current in synchronism with the supply voltage. When electronic controls adjust the magnitude as well as the time of welding current, a smooth, stepless adjustment of welding heat results.

Table I lists the recommended welding conditions for alternating current spot welding of aluminum alloys.

Since the aircraft companies employ large numbers of spot welders, there arose a demand for a machine that re-

(*Please turn to Page* 140)

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Trend in Basic Electric

MELTING of steel in the basic electric furnace is based on three important fundamentals:

1. When the charge is melted the combination of a high degree of oxidation plus high lime in the slag and low temperature permits the elimination of phosphorus as calcium phosphate.
2. After the first slag is removed, a second high lime and low silica slag of extremely low oxidizing power, combined with high temperature, promotes low sulphur and equilibrium conditions in the metal.
3. A dead melted inactive bath on the cold side means steel high in inclusions and otherwise low in quality.

The first of these three fundamentals is common to the basic open hearth, as during the melting and oxidation period the basic electric furnace program is similar to that of the basic open hearth. The importance of low temperature in combination with a highly oxidizing bath has in many cases been overlooked as a most important factor in the elimination of phosphorus. In many electric furnaces (and some open hearths) much trouble has been met with in trying to oxidize phosphorus at temperatures which were too high.

There is some disagreement among electric furnace operators as to the exact function of the second slag. In many cases much time and effort are put upon obtaining a calcium carbide type of slag, as if this were the sole criterion involved in the making of electric furnace steel. The first and most important advantage of the second slag is its high basicity and its low oxidizing power. This is the combination which permits the making of steel under conditions where equilibrium is obtained with the very minimum of products of oxidation.

There are few if any melters who have not been convinced that the combination of an active bath with high temperature is necessary to insure cleanliness and to minimize the tendency towards flaky steel.

By H. W. McQUAID
Assistant Chief Metallurgist
Republic Steel Corp.
Cleveland

Melting in the basic electric furnace can be divided into six different periods, as follows:

1. Charging the furnace
2. Melting the charge
3. Oxidation period
4. Deoxidation period
5. Adjusting of analysis
6. Repairing furnace after tapping

Charging Period: The charge period is an important factor in the production time required as well as in the quality of the steel produced. The charge should, if possible, be of sufficient density so that it can be entirely charged in a single operation, leaving no excess for recharging after an initial melting period. Likewise, the charge should be such as to facilitate as rapidly as possible the formation of a pool of liquid metal on the bottom under the electrodes. The scrap should be selected so as to utilize the high voltage taps to a maximum by spreading the arc throughout the charge. This means that the charge must not be too solid or packed so closely that the arc will be localized. If too large a mass is in the heavy billet type of scrap, there may be considerable difficulty in getting either a complete melt or a maximum distribution of the arc for the quickest melting time.

Just what constitutes the ideal charge is difficult to say, but since a proper distribution of the charge is of extreme importance in the melting, each melter should make a special study of this phase of his operations. Certainly a large amount of heavy bars and billets is desirable, but with them should be charged a sufficient amount of plate scrap, flashings, crushed turnings, etc., to insure the maximum results from the power consumed. It seems to be the general opinion that a small amount of light scrap is desirable on the bottom of the furnace inside the electrode circle. If possible, the heaviest scrap should be directly under the electrodes.

One of the questions which must be answered in selecting an electric furnace is that of the manner in which it is to be charged. In the large type of furnace there is some difference of opinion as to the relative advantage of top charging and charging by means of a charging machine. It is obvious that the top charge method has some advantages, but it also has some serious disadvantages. With a proper grade of scrap and with experience in putting this scrap into the charging bucket, it is possible to reduce the time of charging to a matter of a few minutes. There is also room for much improvement in the charging bucket design. With the poorer grades of scrap it is difficult to arrange the scrap so that the arcs are used to best advantage. The charging bucket in which the bottom is held in position by a heavy rope that burns off in the presence of the hot furnace bottom requires that the bucket be a considerable distance above the furnace bottom to permit free swinging of the bottom segments after the rope burns off. This results in a considerable shock to the furnace bottom and interferes with the placing of scrap where most needed.

The charging machine method, on the other hand, has the serious disadvantage of requiring a considerably longer time, although with less wear and tear on the furnace itself. It permits of a better arrangement of the scrap in the furnace so that it is possible in some cases for the loss of time in charging to be offset by the faster melting. Apparently the top-charged furnace is at its best in ranges up to 40 tons capacity, while in sizes above 40 tons the charging machine type is preferred.

Melting Period: The question of ore addition with the charge is one which has not been fully answered. One group insists that some ore be charged with the scrap. Another believes that no ore should go in with the charge, but that heavy additions should be made as soon as the charge is partially melted.

From a paper presented before American Iron and Steel Institute, New York, May 27.

Steelmaking

A third group believes that no ore should be added until the scrap is completely melted. Apparently the first group represents the most modern and successful practice, since it is not at all uncommon in some of the larger plants to add up to 3000 pounds of ore with the charge in a 60-ton heat. Addition of the ore with the charge has merit in that it insures oxidation of the phosphorus. This oxidation takes place most rapidly at the lowest temperatures, which would, of course, be those at which the bath was first formed. Some plants have difficulty with the action of the ore boil on the electrodes and prefer to add the ore just as soon as there is sufficient bath to permit it, without too violent action under the electrode.

Some melters, even with a heavy charge which will permit the full charging of all the scrap at one time, prefer to hold out some low phosphorus—low-carbon scrap which they add after the first melt-down in order to act as a cooling agent to insure as complete elimination of phosphorus as possible. There is also some difference of opinion as to the lime addition, some melters preferring to add lime with the charge and others to make the initial lime addition after the bath has been well formed. Most melters seem to prefer to add some lime after melt-down, whether they have added any with the charge or not. The lime charge varies considerably from one plant to another, ranging from approximately 2 to 4 per cent. Most successful melters, especially on the larger furnaces, seem to have better results with the lower lime addition, insisting that the high lime charges are a factor in the power consumption. They claim that a 2 per cent lime charge is adequate to retain the phosphorus in the slag as calcium phosphate and that any addition above this unnecessarily increases the resistance to the arc.

Relatively high carbon on melt-down and ore lime charges are important to achieve maximum speed of phosphorus reduction, low hydrogen and fast working of the heat. If the charge is one which would tend to melt low in carbon it is actually better to charge coke or scrap electrodes on the bottom to get the advantage of the lower melting point of the higher carbon steel. The carbon boil is an important factor in producing the highest quality steel and must be included in the melting program.

The melting time in the basic electric furnace is the most expensive period, during which the furnace is being utilized to do work for which it is least well adapted. Power consumption and electrode consumption are at the highest. The design of the furnace and the power available enter, of course, into the rate of melting, but it has been my observation that operators seem to be afraid to utilize to the maximum the power they have available and, consequently, do not push their furnaces as much as they could.

Some operators are having good success by using to a maximum the voltage and power available. One successful melter is strongly of the opinion that maximum power should be used from the start of melting; that the quicker melting will have less adverse effect on the furnace itself. This, of course, is governed by the type of scrap which is being used. If the charge consists of too much heavy scrap the voltage must be reduced somewhat in order to bring the arc close enough to the bottom to insure liquid melting at this point. If the arcs are too long, with an excessively dense charge, there is a tendency for the liquid bath to be formed before the heavy scrap on the bottom has completely melted, a difficult condition to overcome. The fundamental requirement of melting is to melt from the bottom up, and this usually means that the electrodes must penetrate close to the bottom before applying all possible power. In doing this, of course, it is necessary that a liquid bath be formed of sufficient size to protect it. After the electrodes have penetrated close to the bottom the maximum power should then be applied to complete the melting of all the scrap as soon as possible. This is one means of shortening the time of a heat and all possible power should be used after the electrodes have reached the low point. Every effort should be made to prevent the formation of a bath in which the surface is hot and liquid while the bath in contact with the bottom is in a relatively cool, pasty condition, which resists melting.

The contour of the furnace bottom and walls should be designed for fast melting. Many furnaces have improperly built up bottoms with banks too flat and

bottom too deep. The angle of the sidewalls and the backwalls should be steeper than is generally the case. Good results have been obtained by increasing both the steepness of the walls and the flatness of the bottom. Walls should not be so steep that all metal cannot be removed from them in tapping the furnace, but they should be as steep as possible up to this point. Increasing the steepness of the banks and walls promotes the use of a higher and wider bottom. This decreases the adverse effect of arcs which come too close to the bottom on melting and also facilitates greatly the ease with which the total scrap melts down. One of the signs of a poor furnace contour is the tendency of scrap to lie on the banks and require "pushing in." It is my observation that the study of bank and bottom contour is of primary importance in obtaining the fastest melting with the minimum of harm to the furnace itself.

One of the greatest contributions which could be made to production of basic electric alloy steels would be the widespread adoption of specifications for chromium-nickel-molybdenum types

Oxidation Period: The next period in the making of basic electric furnace steel is the oxidation period. This period, begun with the formation of the liquid steel, is a most important factor in the production of high-quality electric furnace steel. It is the period during which phosphorus, silicon, carbon, manganese, etc., are oxidized and during which the temperature of the bath is increased to the point where the steel can reach high enough fluidity to permit the removal of solid nonmetallic inclusions. The degree of oxidation of the bath is determined by the chemical and physical characteristics of the scrap and the grade of steel being produced. Low phosphorus, low silicon and oil-free scrap require less oxidation than those charges containing high phosphorus, high silicon and oily scrap.

Steels which must be low in hydrogen, and lower carbon steels, naturally require more oxidation than the high-carbon grades. High oxidation is important in promoting uniform temperature, in reducing hydrogen difficulties, and in insuring low phosphorus. The action which results from the high oxidation is beneficial in promoting circulation of the colder steel on the bottom, so that from this standpoint alone action is important. The circulation is an important factor in cleaning up the bath by causing the formation through contact of larger inclusions from smaller ones. These larger inclusions, as the bath becomes more fluid, rise into the slag at a highly accelerated rate. In fact, where we have an inactive bath and low temperature at the bottom, the inclusions are most difficult, if not impossible, to remove.

There is some difference of opinion as to the best means for insuring steel of maximum cleanliness, but the first requirement in this respect is the avoidance of a cold, inactive bath. Most successful producers of the highest grade electric furnace steel, in order to meet severe requirements under microscopic and macroscopic etch tests, feel that a high degree of oxidation is essential. They recommend the charging of ore or scale with the scrap or their introduction as early as possible into the first bath formed. Some successful melters feel that in addition to being an important factor in phosphorus reduction and necessary to insure low hydrogen, it is essential to the proper cleaning up of the steel. Some insist that the metallic silicon be reduced to as near zero as possible. Complete oxidation of the silicon may be of importance in insuring that, during the subsequent period of deoxidation, no silicon is being oxidized while other less stable oxides are being reduced.

As soon as the bath is completely melted down, the first step in proceeding with the heat is to check the bath for analysis. Tests should be taken for carbon, manganese, phosphorus, sulphur, chromium, nickel and molybdenum. If the nickel and molybdenum residuals are of no particular interest these analyses can be eliminated. In some heats it is also desirable at this point to analyze for copper, tin, etc.

If manganese reboil and manganese addition is timed correctly, only about 20 per cent manganese is lost in first slag, and with increased temperature and high manganese the chromium recovery from the slag is high

The problem of residuals has become acute due to the difficulty of obtaining scrap which is free from nickel, molybdenum and copper. If the specifications require a nickel-chromium, a nickel-molybdenum, or a chromium-molybdenum type of steel, all of which grades are commonly specified for aircraft use, scrap must be available and the charge must be selected so that the unwanted element is below the maximum. One of the greatest contributions which could be made to the production of basic electric furnace alloy steels would be the widespread adoption of specifications for the chromium-nickel-molybdenum types. The general use of steels of this type, such as are specified in the N.E. grades, would simplify greatly the handling of scrap for the electric furnace and would permit important savings at those particular shops where alloy additions are made.

As soon as the tests are taken, it is customary to add ore and then the balance of the lime necessary to produce a slag having the desired basic properties and a bath with a high degree of oxidation. By the time the reports on the carbon are back from the laboratory, if the oxidation has been sufficient, and the temperature has increased to the point where carbon is being actively removed, it will generally be found that the silicon has approached zero and that further oxidation is unnecessary.

If the analysis indicates that the carbon is still higher than desired, it will be necessary to prolong the oxidation period until the carbon is safely under the minimum specified. If the conditions for charging and melting have been correct, the phosphorus should be under 0.020 per cent, which is satisfactory for practically all alloy steel requirements. There is some tendency for phosphorus reversion if the lime-silica ratio is too low and if the temperature too high. For this reason the melter should check the lime-silica ratio wherever there is any doubt by making a "pancake" test, which indicates by its appearance when the slag is definitely basic.

Deoxidation Period: We have now reached the end of the oxidation period and should immediately start to remove the iron oxide from the bath and at the same time all possible insoluble oxides which would make the heat undesirable from the standpoint of cleanliness. The object of the deoxidation period primarily is to obtain a bath which is as free from oxides and sulphides of all types as is commercially possible and in doing this to have it in equilibrium with a slag which is also commercially free from iron oxide. At the end of the oxidation period the steel should be increasing rapidly in temperature, approaching at least 2900 degrees Fahr.; the carbon should be about 10 points below the desired minimum, the silicon should be close to zero, and the

(*Please turn to Page* 142)

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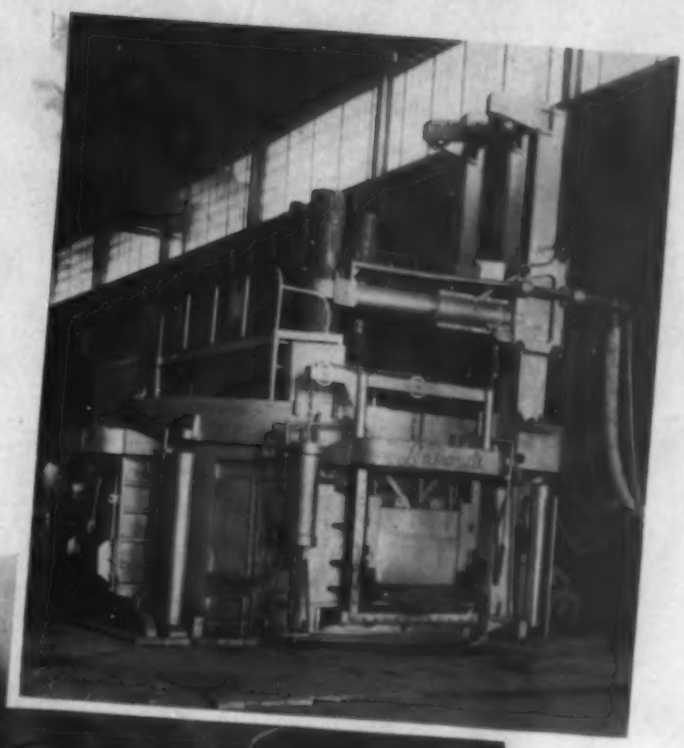

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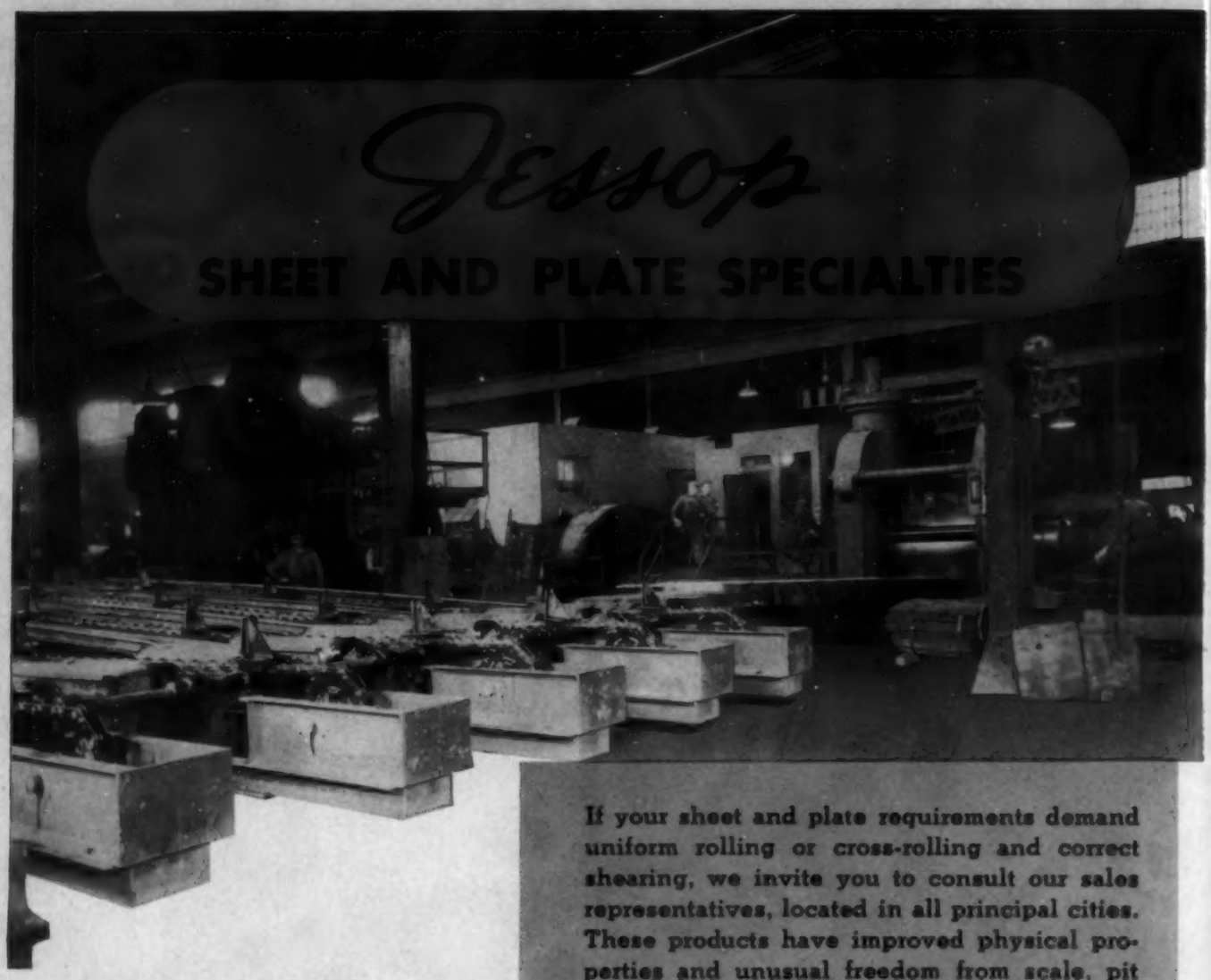

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CHOOSING THE RIGHT SLING

By C. R. HOCHMUTH
Assistant Works Manager
Kearney & Trecker Corp.
Milwaukee

AS MANUFACTURERS of milling machines, we have to handle a variety of loads throughout our plant, such as steel rods, rough castings, parts with finished surfaces and completed assemblies. In addition to truck and trailer transportation throughout the plant and a roller conveyor on the loading dock, many loads are handled by a crawler crane in the receiving department and by overhead electric traveling cranes and jib cranes in the plant.

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Where the sling does not come in contact with polished surfaces, we favor the wire-rope sling, preferably made of preformed rope. Where polished surfaces must be protected, we employ slings of manila rope.

All our wire-rope slings are made of new rope or rope in first-class condition. Worn rope is never used for this purpose because the strength of a rope is reduced by wear and therefore the factor of safety is in question. The dropping of a load because of rope failure is apt to be an expensive lesson, to say nothing of the tie-up in production it might cause.

Slings with spliced eyes or loops are preferred to slings having clip fastenings. The splicing of ropes should be entrusted only to men having considerable experience in such work. Since an improperly made splice may be only about half as strong as one correctly made, we watch our splicing carefully and employ only well trained men for this work. We use thimbles, wherever possible, to reinforce the spliced eye, thereby preventing distortion of the eye, or bight, due to the lead.

In selecting rope for slings, consideration should be given to the risks of handling the sling. Some ropes tend to "barb" when they become worn while others do not. These "barbs," which are ends of broken wires sticking out from the rope, can cause puncture wounds or lacerations to the hands of the men handling the sling. Such wounds are looked upon by medical men as being a probable cause of infection since they often are deep seated. Yet the injured man frequently considers them too superficial to report for first-aid treatment. One of the advantages of preformed rope is that it does not tend to "barb" when wear takes place, eliminating this hazard. Splicers also report that the ease of handling the preformed rope enables them to reduce the time required for splicing.

Where the strands of the rope are cut off after splicing, they present a hazard to those handling the rope. We eliminate this danger by serving the entire splice with soft annealed wire, thereby covering the exposed ends of the strands. After the serving is applied, we put on just enough solder so that the serving wire will not unwind should it become broken, the solder holding it in place.

Slings of preformed rope do not tend to kink or loop and therefore are more easily attached to and detached from the load. This is especially important in those slings consisting of two or more ropes attached to a common ring or link. These slings do not twist up if made of preformed rope, and therefore it is not necessary to disentangle them every time they are used.

Perhaps the worst thing that can hap-

(*Please turn to Page* 148)

FEEDING BRITAIN'S WORKERS

Today, industrial canteens and government sponsored communal feeding establishments account for 43 per cent of Britain's catering places. These include more than 5000 industrial canteens operating in war plants; 500 canteens on building and civil engineering sites, docks and the like; and nearly 1000 canteens at coal mines. In addition, some 2000 British official restaurants have been set up, many of them serving industrial areas

By D. V. BAKER

IN BRITAIN our Ministry of Food has a pet slogan: "Food is a munition of war!" That is to say we have realized from the outbreak of war that the efficient feeding of the population, and particularly of the vast body of war workers in the factories and workshops, is as important a wartime task as the actual production of the final guns, tanks or airplanes. Workers who are under-fed —or, for that matter, over-fed or wrongly fed—are not going to produce maximum results.

Tiredness, nervousness and definite ill-health, often due solely to lack of proper nutrition, can quickly play havoc with factory production charts. For these reasons it is imperative to ensure that factory workers are given plenty of good, nourishing food, together with adequate time and restful surroundings for eating their meals. Now, such a worthy aim can be simply put into practice in peacetime, when there is an abundance of all necessary foods and equipment. But in wartime—well, the task becomes definitely not so simple.

There are endless difficulties to be overcome—the lack of the right nutritive foods, the vast increase in the numbers of workers to be fed, the problems of providing alternative cooking facilities that feeding can be carried on even if air raids have put normal cooking equipment out of action—and so on. After nearly four years of hard war-time conditions, it can definitely be stated that here in Britain we have at last overcome all the main difficulties and put our industrial catering on an ordered, efficient basis. To do this we have had to suffer much and learn much, and I feel that the results of these experiences, outlined in brief, can be of considerable assistance to manufacturers and industrial catering firms in America.

When war broke out, there was an immediate mobilization and expansion of Britain's industrial resources. Work began at once on the erection of hundreds of new war factories, some in existing industrial areas, but many more dotted about all over the country, come in quite isolated spots. At the same time, existing factories went about extending their production plants to the maximum, taking in large numbers of extra workers. Coinciding with their production worries, harassed works managers were faced with urgent demands for the provision of huge air raid shelters, fire-watching and civil defense protection, and so on. Consequently, it was hardly surprising that, at first, the canteen and feeding problems did not receive the amount of attention that it demanded.

Fortunately, this state of affairs was quite temporary, thanks largely to good educational work on the part of our Ministries of Food and Labor, both of which quickly set up special departments to deal specifically with the provision, supplying and staffing of industrial canteens. The Ministry of Labor issued a regulation that henceforth every factory or workshop employing 250 or more workers must provide its own canteen for its workers. Naturally, a great many of the larger factories already had canteens, but many of the medium-size places had rather neglected this side of their welfare in peacetime. Following the new order, then, this position was regulated and improved all round.

At the same time, some judicious propaganda in trade and technical papers, sponsored by the Ministry of Food, succeeded in persuading a surprisingly large number of smaller manufacturers to make special arrangements for obtaining meals for their workers. In some cases joint arrangements were made with a number of other nearby small firms; or an arrangement was made for a local catering establishment to provide special cheap meals at a set time; or an arrangement was made for a catering firm to supply a daily lorry-load of hot cooked meals from their kitchens.

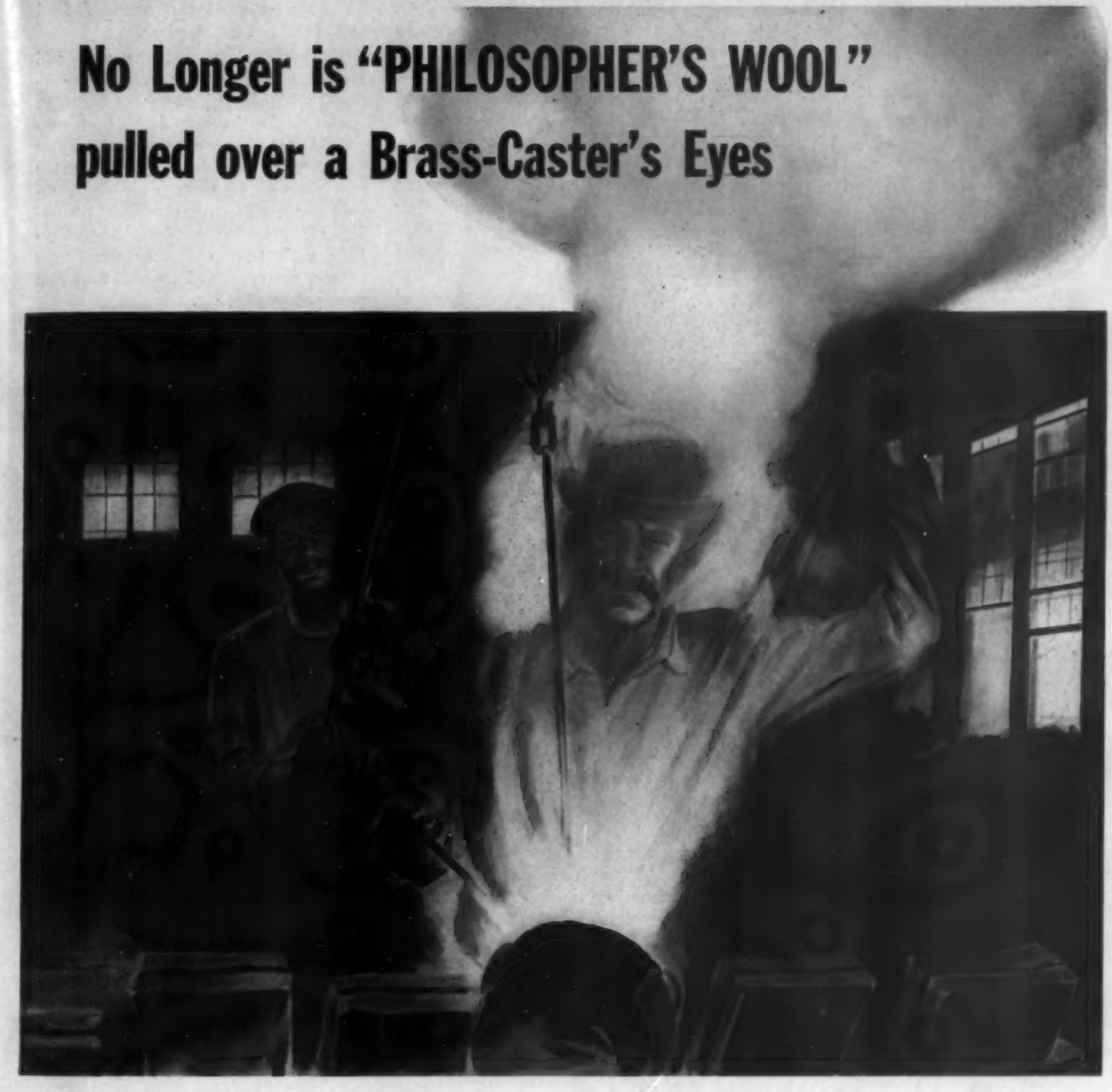
The larger factories, however, were faced with a number of problems. In the first place, they had to provide a much greater output of hot meals than in peacetime necessitating the installation of new and enlarged cooking equipment. Here the Ministry of Food took a hand, and a special order was issued under which supplies of catering equipment were earmarked especially for industrial canteens (i.e. the latter were given priority demands). At the same time the Ministry, by arrangement with other government production departments, arranged that where necessary catering machinery makers should specially adapt their production schedules to produce vital machinery for industrial canteens. The Ministry argued, and of course they were quite correct, that this job of work was of vital importance to the war effort.

All the large factories were speedily supplied with huge steam heating plants, heat storage cookers, gas and electric cookers, new types of automatic washing machines, and so on. At the same time, with the guidance of the Ministry of Food and the Ministry of Home Security (which is responsible for civil defense) the opportunity was taken, as far as possible, to have installed alternative methods of cooking, independent of central fuel systems, which could be used in the event air raid damage put normal cooking systems out of action.

For this purpose, special types of cookers, working on anthracite and coke were installed—while another development was the introduction of special insulated containers which would store food and keep it hot for several hours. During air raids these have proved to be invaluable, as it has been possible to cook hot foods on an independently-fueled central cooking system, and pack the foods in the insulated containers and take them out to various factories whose own cooking systems have been damaged.

The next immediate problem was the organization, administration and layout of the canteens. In the first place, it was essential that the minimum amount of labor should be used in operating the canteens, labor being so vital and valuable in wartime. For this reason the Ministry of Food encouraged manufac-

No Longer is "PHILOSOPHER'S WOOL" pulled over a Brass-Caster's Eyes



In the old days, a brass-caster stirring his crucible would often get a whiff of "Philosopher's Wool" from the boiling zinc . . . like steam from the fabled Philosopher's Stone . . . that would give him the "spelter's shakes". Yet it never occurred to him that the casting might suffer because of his passing staggers. For he did most of his work by smell or touch or some other rule of thumb. Then, brass was sold "as is", and no questions asked.

But there's no trace of fog remaining in brass-making practice today. At Bristol, any question asked by any brass-fabricator can be answered promptly and specifically . . . and the answer will hold good throughout any number of sheet, rod or wire shipments that are completed to the specifications agreed upon. Automatic production control, repeated laboratory checks, and searching physical tests guarantee that the customer gets his brass from Bristol exactly right for the job it has to do.

That's the way war-production plants all over the world are getting Bristol Brass today . . . in the ever-increasing quantities needed to seize the offensive on all United Nations fighting fronts. And when the war is won, Bristol will have a lot of new knowledge to put to work for the products of peace.

BRISTOL BRASS

★ *Buy War Bonds to Buy Brass for Bullets* ★

THE BRISTOL BRASS CORPORATION, MAKERS OF BRASS SINCE 1850, AT BRISTOL, CONNECTICUT

turers to plan out their canteens as much as possible on a self-service basis, with a minimum number of permanent staff to superintend the service, handle cash, etc. The self-service system, we have found, makes for greater speed as well as economy in personnel, and it is applied quite widely in our factories. In fact, many canteens are laid out especially as self-service units. A system of guard rails is used; diners come in at one entrance, collect dishes and utensils from special open cupboards or trays, pick up their various dishes down a row of serving compartments, then pass into the restaurant. At the end of the meal they deposit their dirty crockery at a specially labeled compartment (thus saving time and energy on clearing up tables), and pass out by a single cashier box. Most factories favor a cash payment system, but some have adapted a check or counterfoil system, workers purchasing a book of tickets, each entitling them to a meal, and using them during a week. This again, does save time.

In regard to the appearance and equipment of the actual restaurant section of the canteens, most firms have taken the Ministry of Food's advice and adopted bright colorful decorations, comfortable and modern seating accommodations, phonograph and radio music and so on. Some firms arrange for concerts and talks during canteen meals, but generally the workers prefer to eat their meals and have a cheerful gossip with their friends. There are many firms, incidentally, who have employed well-known artists to decorate the walls of their canteens—it having been found that color plays an important part in encouraging workers to relax. Brightly colored table tops and chairs are being favored, too, and colored floors.

Third, and of course most important of all, is the question of food itself. Large-scale cooking has problems all of its own. Again, in regard to most of the canteens, it is necessary to operate three or four "shift" lunches—serving, on an average, perhaps 300 to 500 workers at a time. In very big plants, where the workers range up to 10,000, there are of course, three or four separate canteens.

Wastage of food, either in buying or cooking, being a real crime in wartime, it has been essential that every factory canteen have a fully-trained cook, alive to all these problems. Our Ministry of Food have again been helpful here, as they have arranged special courses of training for canteens cooks. In addition, they send down instructors and demonstrators to the factories. Furthermore, the Ministry will, if necessary, supply complete charts and memorandums as to what foods are needed, where and when they can best be purchased, how they can be utilized to insure no wastage, and so on.

Special training is also given in buying, though here regulations give canteen managers priority in the food markets, so there is usually not much difficulty in obtaining sufficient *quantities*, though very often the choice in variety is limited. It is here, of course, that a fully-trained cook is invaluable, for planning menus in wartime for many hundreds of people is no easy matter. Canteens are supplied with extra supplies of the rationed products, such as margarine and butter, cheese, bacon, meat, tea, sugar, etc. But even so it is not possible to use them extravagantly.

On the other hand, generally speaking, there have been very abundant supplies of home-grown vegetables, and it has been the tendency of our canteens to use vegetables on a scale never before contemplated. Taking the average, it would seem that every canteen does manage to supply a meat or fish dish every day, but at the same time alternative vegetarian dishes, and salads, cold dishes, and the like are provided. In this way, a gradual, but nonetheless definite re-orientation of workers' food ideas has been taking place.

If compelled to eat the new and substitute dishes, workers might have refused point blank; however, seeing them available, they have gradually been persuaded to sample them—and, liking them, to sample them again. In the past year or so, canteen managers report a surprising increase in the number of vegetarian meals sold—particularly such tasty dishes as cauliflower cheese, macaroni and cheese, vegetable pies, potato pies, etc.

Salads Popular

Fresh salads, too, have become more and more in demand. Of course, all this is actually to the good, since medical opinion now agrees that it is such foods that help to give the workers better health and stamina. Naturally, the trend has been very largely encouraged by the steady educative advertising of the Ministry of Food. This advertising, prepared in conjunction with the Ministry of Agriculture, who are able to supply details of which products are in best supply, has aimed at persuading British workers to eat more and more of food that is *home*-produced. It is having a great success—though of course, this does not detract from a very real appreciation of the tasty foodstuffs sent over from America.

Working on the basis outlined and with the aid of special advice and guidance from the Government departments plus the advantage of cheap wholesale buying, a typical British factory canteen today supplies the worker with a good hot mid-day meal for a price varying between 10d (20c) and 1s 2d (26c). This meal consists of soup, a main dish or entree and vegetables, a hot or cold sweet, and a cup of coffee or tea. If the workers were to go to an outside private restaurant, run on commercial lines, they would probably have to pay up to 2s for the same meal. Canteens are naturally not able to supply a la carte menus—it is always a set meal, though with one or two alternatives (such as a salad). At the same time, a certain amount of incidentals are sold —such as biscuits, sandwiches, light drinks, etc.

It should be realized, too, that our canteens also supply breakfasts, teas and suppers, since most factories now work all day and night, and there are always workers coming off or on a shift who want a meal. Similarly, the canteen staffs work on 8-hour shifts.

Another important function of the canteen is the provision of hot drinks and soups which are taken into the factory workshops—favorite times being 11 o'clock in the morning, 3 o'clock in the

Industrial Catering Equipment Pool

Britain's Ministry of Food, by arrangement with the Ministry of Works and Buildings, has set up a catering equipment pool, comprising no less than 160 different items—including double oven ranges, boiling pans, galvanized vegetable racks, washing machines, storage cylinders, tea and coffee pots, glazed sinks, potato peelers, mixing machines, etc. All main supplies are now produced to standardized patterns with production distributed among a large variety of manufacturers, thus facilitating and speeding the rate of supplies. From this pool, industrial canteen managers are able to obtain priority supplies.

TOOL LIFE *must* BE PROLONGED

Houghton offers 2 helpful ideas

1 SALT BATH CASING OF TOOLS

Molten salt bath treatment of tools after the regular cycle of heat treatment has resulted in triple tool life—and more!

This nitride case is applied by a few minutes' immersion at 1000–1050° F., and provides hardness up to 1100 Brinell.

Spline broaches, for example, lasted for only 12 pieces in one plant. After nitriding the broaches they produced 300 pieces. Another user of Liquid Heat 720—the Houghton salt for this purpose—reports an increase from 100 shells per tap between grinds, to 2200 shells before grinding was necessary. In many instances, tool life has been increased 300 to 500%. Some plants make it a practice to treat all new broaches before using them.

The cost of this salt bath treatment is extremely low—the results extremely valuable in conserving precious tools. Write for copy of paper presented at A. S. T. E. Convention describing this final casing treatment in detail.

2 CAREFUL SELECTION OF CUTTING FLUIDS

One important way to preserve precious tools is to examine carefully the cutting fluids being used.

Anti-welding properties are provided by sulphur additions of the right type, correctly blended. Extreme pressure properties enable the oils to carry greater loads, withstand higher pressures. Carefully chosen additives permit the use of lighter-colored oils, giving better visibility of the work.

Treatments such as these mean longer tool life, finer finish, and the faster production so vitally needed today.

BUY THE BASE AND SAVE THE SPACE

Houghton Cutting Concentrates enable the user to purchase blending oil locally and save needed shipping space on crowded transportation lines. These bases are highly concentrated, enabling greater dilutions. A selection to handle any machining operation can be readily made if you consult the Houghton Man.

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afternoon, 10 o'clock at night, 2 o'clock in the morning. For this purpose, every canteen has a stock of the insulated containers referred to earlier. These are mounted on casters and wheeled from shop to shop. Drinks or soups are thus served out boiling hot, instead of lukewarm, as would be the case otherwise. I might add here that works managers report that mid-morning and mid-afternoon drinks (sometimes milk drinks are served, but shortage of supplies limits this) are a definite incentive to production. Workers welcome the short break, even if it is only a few minutes, and are the better for a warming drink.

Naturally, owing to definite shortages of various foods, it is by no means possible to supply workers with the most nutritional meals possible. However, thanks again to special advice and reports by the Ministry of Food, canteen managers are able to plan menus that will provide as nourishing a meal as possible. All the latest information about vitamins, proteins, carbohydrates and other food values are now taught to cooks, who are able to make good use of this knowledge. Among general items, we have found that increased supplies of cheese and egg and milk products, also of pulse foods and green vegetables, tend to offset any food values lost through shortages of other necessary foodstuffs.

Experience has shown us that reduced quantities of meat-stuffs definitely have no harmful effect on workers—rather, if anything, there seems to have been an improvement. Certainly it is generally agreed here by medical men that the fitness of the British people is higher than it was in many years before the war, despite the longer hours of work. This is attributed largely to improvements in dieting and feeding.

There has had to be considerable reduction in consumption of cakes and pastries, and even bread; but this, too, has improved, rather than deteriorated health.

A word is necessary here as to special and unusual circumstances connected with industrial catering. For instance, many of our new factories are set up in remote country areas, where food supplies are more difficult to obtain than in town areas. Usually it has been found possible to make arrangements with the railway companies to bring special food carriages down from central depots. At the same time, one way of helping to alleviate the position has been found in the encouragement of land cultivation by the factory workers. There is a constant and general "Dig for Victory" campaign over here. This can have a special application to big factories, many of which have large open grounds. Most of our big firms have now taken up cultivation of every available piece of land. Often the workers are glad to take responsibility for allotments of their own, selling the food direct to the canteen.

Another way in which the isolated factories have met their problems has been the usage of mobile canteens. These usually consist of converted lorries or cars with trailers. They are equipped with compression steam cookers, insulated urns, water tanks—in fact, everything for the kitchen—together with alternative and independent fuel systems. Most of these mobile kitchens can serve up to 500 hot meals within 2 or 3 hours. They are often sent out once a day from a town to isolated factories, and serve their purpose admirably in providing a necessary hot mid-day meal—the factory being able to cope with minor meals, drinks, and the like.

Finally, mention should be made of the great scheme of communal feeding, through British restaurants, which now covers the whole of Britain. This has been directly sponsored by the Ministry of Food by arrangement with local authorities and is a service apart from industrial canteens, but one which does in fact prove very useful to factory workers. Every city, town and large village now has its own British restaurant. Today there are about 2000, according to Lord Woolton, Minister of Food. These are set up in central buildings, operated usually by social workers and voluntary helpers, and provide a cheap 9d or 10d meal of three courses.

They are operated on much the same lines as industrial canteens, with the exception that they are available to the public in general—particularly to housewives, shop and office staffs, etc. But in practice, quite a large number of factory workers, seeking a change, or according to their taste, make use of these British restaurants. There is usually a British restaurant for each big industrial area. Experience has shown that it is invaluable for absorbing various groups of workers and providing quick meals, thus saving possible waiting at a busy works canteen.

Installing & Equipping A Canteen

Here is how a British engineering firm set up its own medium-sized canteen. An old store-room was taken over, large enough to hold about 200 people. To minimize fatigue, the original cement floor was covered with wooden boards. One section was converted into a dining-room, with plain simple wooden tables and chairs (though in general our canteens prefer long bench tables and seats). Cooking equipment was installed, with the aid of a Ministry of Food expert, and included two General Electric and three gas cookers, two sinks and draining boards, a Frigidaire and a Lumley heater, ensuring a constant supply of boiling water—while connected to this unit was a smaller urn for storage of hot milk, cocoa, etc. In addition a steamer was installed, capable of producing 156 individually steamed puddings simultaneously. Another practical item was a set of metal containers, each capable of holding one portion of hot food. This canteen opens from 7 a.m. to 11 p.m., serving two full meals and various snacks and is staffed by eight workers, working 8-hour shifts.

How Great Britain Has Managed Price Control

Rationing and Price Control in Great Britain, by Jules Backman; paper, 68 pages, 5¼ x 8 inches; published by the Brookings Institution, Washington, for 50 cents.

The eleven chapters of this review of Great Britain's experience cover the basic legislation and regulations, control agencies, raw material controls, food controls, price control and rationing of non-food products and services, rent control, wage policy, fiscal policy, enforcement, price trends and highlights of the British experience.

Under food control the author treats of agricultural prices, food prices, subsidies and rationing, with interrelations of each.

Under non-foods and services he treats of the prices-of-goods act, the goods-and-services act, charges for services, standardization and quality specifications and rationing.

The author takes a middle course in appraising the effort and effects as developed in Great Britain and calls attention to differences in the situation there and in this country.

In the final chapter he sums up the highlights that have appeared as a result of the various plans to control business conditions under stress of war.

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Photo Courtesy of Boeing Aircraft

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Mult-Au-Matics are furnishing parts for guns, planes, tanks, ships, shells, bombers, and are multiplying the output of each worker by the multiple spindles of each machine . . . more output with fewer men. Bullard Mult-Au-Matics — and Vertical Turret Lathes too — are big essential factors in Ordnance production.

Bullard wants to be certain that every one of their machines does its magnificent best towards victory. Consult us freely on individual problems.

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BRIDGEPORT
CONNECTICUT

This unit is one of a battery of special automatic presses that utilizes hot and cold air in the production of frames for Addressograph plates. Data and photo from Compressed Air Institute, New York

35 Miles of Compressed Air Help

"BEAT THE PROMISE"

THE VALUE of compressed air power in war production was strongly emphasized in a recent survey of its uses at Addressograph-Multigraph Corp. by the Compressed Air Institute of New York. Practically all factory departments use compressed air. Two compressors furnish an average of approximately 390 cubic feet of compressed air per kilowatt hour of power consumed.

About 35 miles of pipelines for the compressed air system serve the more than 300,000 square feet of floor space at this plant. More than 2350 outlets are distributed at key points. A pressure of 78 pounds per square inch is maintained for maximum requirements. Storage facilities consist of two tanks; one 4 x 11½ feet, and one 3½ x 8½ feet.

When the main shift is on duty, a 175-horsepower compressor equipped with a Kleon air filter, is used to supply a greater volume of compressed air. It operates at 257 revolutions per minute. During the night shift, the larger air volume is not required and a 50-horsepower compressor furnishes sufficient volume. Its speed is 277 revolutions per minute. By rotating the use of the compressors, the life of each is prolonged and waste of surplus electric power is prevented. Yet, both compressor units are available for emergencies.

The compressors are of two cylinders each, with cylinder diameters in the larger unit being 18 and 11 inches, and in the smaller unit, 13 and 8 inches. Cylinder stroke in the larger compressor is 14 inches, and 12 inches in the smaller unit. The automatic cut-in and cut-out points on the 175-horsepower unit are 76 and 85 pounds per square inch respectively, and 75 and 85 pounds per square inch respectively on the 50-horsepower unit.

The uses of compressed air throughout the plant are many and varied. Scores of outlets are furnished for general uses such as cleaning surfaces prior to painting, for spray painting and for cleaning excess metal from machine parts. For most such common uses, Hansen and Cleveland Pneumatic nozzles are suspended from overhead supply line outlets.

One of the most interesting applications concerns the use of compressed air in conjunction with a battery of eight Loshbaugh-Jordan No. 4 upright presses. Each of these presses punch, perforate and form 3200 soldiers' identification tags per hour. A jet for compressed air, located in a fixed position at the side of the die, releases intermittent blasts of air which are synchronized with the forming operations. As the nickel-silver tags are completed, the air blast loosens the tag from the die and blows it into a chute which carries it to a floor-level receptacle.

One of the most interesting applications concerns the use of compressed air in the production of zinc and alloy plate frames for Addressograph machines. The punching and forming of these units is handled on Henry and Wright presses specially designed for this purpose. See accompanying illustration. Finished frames are produced at the rate of 3000 per hour.

Due to the extremely high press speed, the strip material is fed from a continuous roll held on a spindle. It is saturated with an oil coolant to preserve the cutting edges of the punches and dies during each of the 11 progressive steps in press operation. As the completed frames reach the discharge track, shown in illustration, they pass through an electrically heated oven which quickly dries the oil film on the metal. An additional jet of cold air then strikes the frame units, clearing the completed frames of chips and metal particles.

With war restrictions promoting increased activity in used equipment, the rebuild department is making more use of compressed air for initial cleaning of old Addressograph and Multigraph machines sent in for reconditioning. Several outlets provide air lines for cleaning out the accumulated dirt and grease. Special Hansen nozzles with 6-inch and 8-inch extensions are used for cleaning central clutch assemblies, motor armatures and other parts of machine that are ordinarily inaccessible. The additional use of compressed air cleaning

methods are said to have reduced considerably the time necessary for reconditioning.

Compressed air also plays an important part in the production of Multigraph type. Hundreds of fonts of type are cast daily from molten metal—after which it is ejected in a moving line of separate type characters. Two air jets, one directed against each side of the finished work, blow off all loose metal particles so that each character unit is clean and sharp. This air cleaning operation saves time and eliminatae many defective units that would otherwise be rejected in final inspection.

These and many other uses of pneumatic power in Addressograph-Multigraph factory procedures, indicate how compressed air can serve a major purpose and solve production problems.

The Effect of the War Program on . . . .

Electrical Contact Materials

By C. B. GWYN JR.
Chief Engineer—Contacts
Fansteel Metallurgical Corp.
North Chicago, Ill.

MANY electrical contact materials have been restricted and allocated under the war program, and as a result compositions and mechanical designs of many items have been revised, new materials introduced, and scrap reclamation facilities improved by the industry. The severe service requirements of war equipment have also dictated the revision of compositions for certain applications.

Materials which are restricted by supply or allocation include tungsten, silver and alloys of iridium. Currently the use of iridio-platinum contact alloys is restricted by allocation to aviation magnetos and certain types of aviation voltage regulators. The platinum-ruthenium series of contact alloys, such as Fansteel Fasaloy No. 12, have very successfully replaced iridio-platinum for voltage regulators, many types of aviation magnetos and for sensitive instruments.

Silver, one of our most plentiful contact materials, is currently under restricted contact use, but pending legislation should quickly remedy this. The supply is ample for all requirements.

Tungsten for electrical contact purposes has now been removed from the allocation group, and it may be had without restriction. The supply for this purpose is ample.

Typical examples of compositions revised to meet war requirements are found in aircraft and tank relays. In similar civilian relay services fine or coin silver or silver-base alloys are suitable. However, due to the large safety factor required in the corresponding war equipment, it has been found necessary to go to alloys or admixtures having special arc-quenching or nonwelding properties. Fastell grade E, having as its main constituents molybdenum and silver, is an example.

Materials which must be supplied in new forms and mechanical designs to meet war service requirements include those used in many control units. These units are so sensitive or work in such rapid sequences or under such unrestricted conditions of temperature, atmosphere and altitude as to require close mechanical tolerances and often special shapes in the form of cones, rounds, balls, etc. The production steps required were not formerly considered feasible, but these units are now items of routine production.

In order to conserve vital copper, zinc, etc., tests have been conducted, and as a result many composite types of contacts now have plated steel backings. A composite contact is one having a facing of contact material and a brazed or bonded backing of, for example, copper. Before such substitutions could be made it was necessary to develop dependable corrosion-resistant platings or claddings for the steel backings. It was also necessary to determine the effective load capacity of such backings and to redesign contact assemblies proportionately.

Table I indicates contact materials, present supply of these materials and recommended substitutes chosen with regard to availability and suitability. It must be recognized that no general rules can be established for interchange of contact materials. However, any of the reliable contact manufacturers in the United States will gladly co-operate in establishing acceptable substitutes for any given types of service. This is particularly vital on new equipment.

Greater care than ever before is being employed to conserve all scrap contact material and to keep it segregated by composition so as to utilize it fully with the minimum effort possible.

Our present supplies of contact materials should see us through the emergency if we all co-operate carefully in design, substitution and conservation.

TABLE I—Electrical Contact Materials

Contact Material	Present Supply	Recommended Substitutes, in Preferred Order (Chosen with regard to availability and suitability)
Tungsten	Not allocated, supply satisfactory	Molybdenum, silver
Platinum	Allocated, fair supply	Tungsten, palladium, gold, silver
Platinum-Iridium	Allocated, very limited supply	Platinum-ruthenium, tungsten, palladium alloys
Silver	Allocated, but ample supply	Silver-base alloys, copper, palladium
Palladium	Not allocated, ample supply	Palladium alloys, silver alloys
Molybdenum	Not allocated, ample supply	Tungsten, silver, palladium
Copper	Allocated, supply limited but available	Copper-base alloys, clad or plated steel
Nickel alloys and admixtures	Allocated, supply limited	Tungsten-base alloys or admixtures, molybdenum-base alloys or admixtures
Tungsten alloys and admixtures	Not allocated on tungsten content, silver or copper content allocated; supply plentiful	Molybdenum-base alloys or admixtures, silver-base alloys or admixtures
Molybdenum alloys and admixtures	Not allocated on molybdenum content, silver and copper content allocated; supply plentiful	Tungsten-base alloys or admixtures, silver-base alloys or admixtures

Note: It must be recognized that no general rules can be established for interchange of contact materials. However, any of the reliable contact manufacturers in the United States will gladly cooperate in establishing acceptable substitutes for any given types of service. This is particularly vital on new equipment.

Greater care than ever before is being employed to conserve all scrap contact material, and to keep it segregated by composition so as to utilize it fully with the minimum effort possible.

DODGE GROUP DRIVES BOOST *Battle Power*

"SHARE-THE-RIDE" Principle in POWER TRANSMISSION

Modern Dodge Group Drive applies share-the-ride principles to horsepower delivery. Taken from its source, capacity power, over short power "roadbeds," is delivered enroute to a group of production machines. Group drive permits one motor to do the work of several (a *powerful* advantage in these war days when conservation of materials and manpower is so vital).

Dodge Group Drive puts all the power in the job . . . boosts battle power, hastens Victory! By reducing connected horsepower, conservation is assured in motors, wiring, controls and other critical equipment and materials. Initial cost is low . . . fixed charges and maintenance costs are reduced. Cost of horsepower-delivery drops.

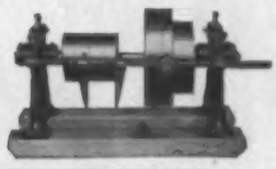
In the complete Dodge line are all the component parts for group drive . . . shaftings, hangers, pulleys, bearings, clutches . . . as well as individual motor drives, including D-V Matched Quality V-Belt Drives.

Contact nearest Dodge Distributor or write

DODGE MANUFACTURING CORPORATION, Mishawaka, Indiana, U.S.A.

DODGE SHAFT HANGERS

Shown here is the Dodge 4-point Pressed Steel Drop Hanger which may also be used as a Post or Bracket Hanger. 2-point and 4-point Iron Hangers also available.



DODGE COUNTERSHAFTS

Can be supplied to meet any specifications with the proper type of hangers, bearings, pulleys and clutches to meet any requirement.

DODGE-TIMKEN Hanger Bearings

A completely assembled, factory adjusted, pre-lubricated unit delivered ready to install. Effectively sealed against admission of dirt or loss of lubricant.

DODGE STEEL SPLIT PULLEYS

Strong, rugged, light in weight. Easy to erect. Grooveless oval crown permits low belt tension—saves power. Also wood and iron pulleys for every service.

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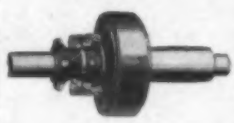
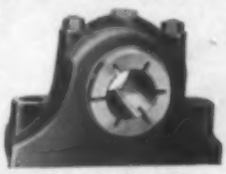


The Dodge Solid Friction Clutch shown here is particularly adapted for modern group drives and general power transmission service. Other types and sizes up to 1000 HP. at 100 R.P.M.

DODGE-TIMKEN PILLOW BLOCKS



For power transmission or machinery applications. Completely assembled, factory adjusted, pre-lubricated; seals exclude dust and dirt and retain lubricant. Easy to install. Long life (30,000 hours of service under conditions for which they are adapted) . . . (good for 50 million revolutions without re-lubrication, under normal conditions).

DODGE VICTORY WOOD SPLIT PULLEYS

Great tractive pull . . . long belt life . . . power saving. Balanced. Interchangeable bushings (for various sizes of shafts). Compression fastening to shaft. Easy to install. Light weight. They conserve metal!

Dodge VICTORY Wood Split Pulleys on a double reduction drive.

DODGE

MISHAWAKA

GROW ALL YOUR SCRAP INTO THE FIGHT! BUY MORE WAR BONDS!

THE RIGHT DRIVE FOR EVERY JOB

PUT *ALL* YOUR POWER IN THE JOB

INDUSTRIAL EQUIPMENT

Welding Positioner

Ransome Machinery Co., Dunellen, N. J., announces a new welding positioner designed to handle loads up to 500 pounds with the center of gravity of load 6 inches away from the table top and with a 6-inch eccentricity. It is being offered in hand or motor-operated models and is particularly suited to work ordinarily handled by women welders.

The motorized unit includes a Reeves variable speed drive providing a speed range of up to 1 revolution per minute of the table top. Tilting range is a full 135 degrees from horizontal or 45 degrees beyond vertical providing the "down under" position for all downhand welds.

The 26-inch diameter circular table top is T-slotted. All gears are of the

cut-tooth type. Machine is furnished with a regular base for bench work or with a sub-base giving a height adjustment from 27 up to 42 inches from the floor line to the table top.

A clutch arrangement permits free rotation of the table top by hand when required. The motorized units can be supplied with a hand wheel in place of a motor for tilting if desired.

Dry-Type Transformers

General Electric Co., Schenectady, N. Y., announces a new series of dry-type natural-draft transformers for indoor use on 600 volts and below. Compared with the series they supersede, size and weight of the new transformers have been materially reduced.

Ventilation has been made more effective by slanting louvered side plates inward at the bottom and top of the case. The new transformer has a 2-legged core with a high and low voltage coil on each leg. The core is clamped at its top and bottom, with the bottom clamps also serving as mounting feet. Used thus, they provide a base, being drilled so that the transformer may be bolted to the mounting surface if desired.

The top clamps are used for lifting the transformer, and also serve as the upper bracket, if the transformer is wall mounted. Because of the unusual case design, the unit can be mounted against a wall or close to other units with little

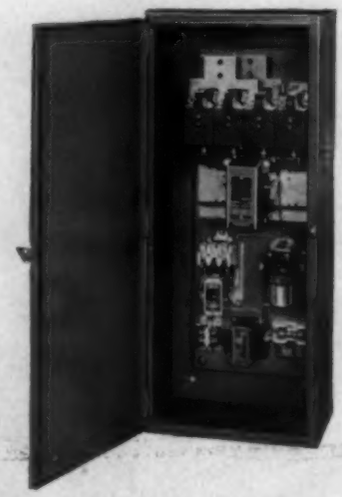
or no effect on temperature rise. The high and low voltage coils are concentric with air ducts between them which provide extra insulation and cooling.

Use of two small coils instead of one large coil has permitted them to be designed with more turns of smaller wire for the same copper loss, resulting in lower exciting current and lower inrush currents when the primary of the transformer is energized.

The transformer case is of light-gage steel since it only provides a protective covering for the coils and is not used for lifting or mounting.

Safety Control

Industrial Controller Division, Square D Co., Milwaukee, recently introduced a new safety control for alternating-current arc welders which eliminates the hazard created by high open circuit voltages. The safety panels developed, referred to



as class 8992, eliminate operator injury due to physical contact from electrode to grounded metal surfaces when not welding.

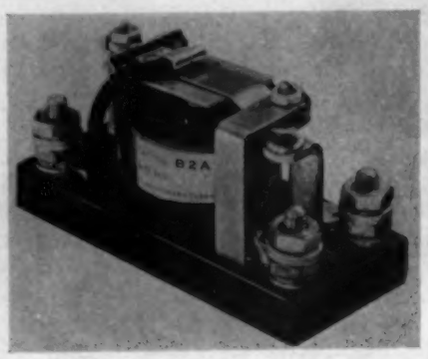
They eliminate this hazard by automatically disconnecting the welder transformer after the arc is broken. The transformer is automatically reconnected the instant the operator touches the electrode to the work.

The manufacturer stresses an economy angle also. When the safety panels are used, the welding transformer primary circuit is connected to the power line only while the arc is held.

Substantial saving in power is effected, it is said, when a number of welders are used on a single power system and the power factor is improved. The new safety panels can be used with any make or model of alternating-current transformer type arc welder. External connections are said to be simple.

Power Circuit Relay

Ward Leonard Electric Co., Mount Vernon, N. Y., is offering a bulletin 103 relay designed particularly for aircraft power circuits. It will perform at high values of acceleration of gravity and



also under conditions of vibration and shock, it is said.

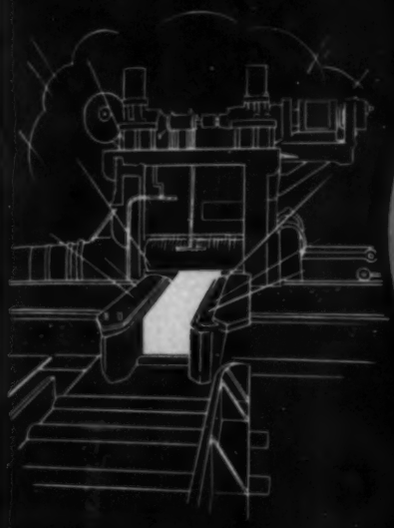
Armature and contact assembly of the unit are designed to retain either position under these conditions, it is said. The normally-open single-pole contacts are rated 25 amperes at 24 volts direct-current non-inductive load, with good characteristics on inductive loads. The contact gap and tail spring tension are adjustable. Bakelite nearly ⅜-inch thick forms the base of the relay, measuring 1⅜ x 3⅛ inches.

Coolant Pumps

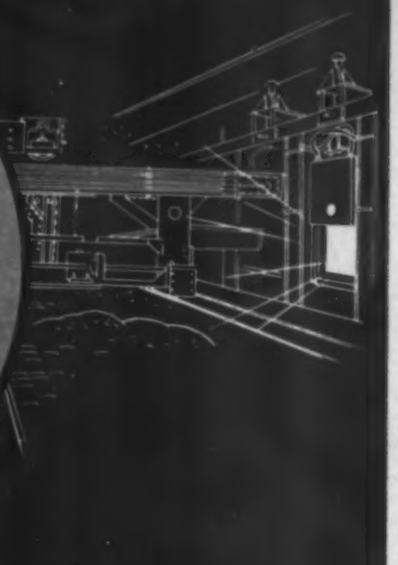
Pioneer Pump & Mfg. Co., Detroit, is now offering three new war model coolant pumps designed to save critical materials. Each model, it is reported, is available in 17 standard sizes.

Not only do the pumps save critical metals, but their versatility of application, permitting interchangeability with other make pumps, enables a user to keep his inventory reduced to a minimum, for

Thanks to the Continuous Scrap Drive



ANDREWS STEEL



PRODUCES 24 HOURS OF EVERY DAY

A minimum of 90 million tons. That's what is expected of the steel industry in 1943.

To produce 90 million tons the mills must have 45 million tons of scrap metal. That's a lot of scrap, but with all America cooperating, we'll get it. With a continuation of the scrap metal campaign the steel industry will be able to make its 1943 quota. Are you doing your share to keep steel rolling twenty-four hours of every day?

THE ANDREWS STEEL CO.
NEWPORT, KENTUCKY
DIVISIONS
THE NEWPORT ROLLING MILL COMPANY
THE GLOBE IRON ROOFING & CORRUGATING CO.

each pump presents the possibility of many different applications.

Model VBD features three outlets to permit piping to either right or left side, or back into coolant sump through intake bracket.

Model VA is used where submersion in coolant sump is more practical or less objectionable than outside mounting would be.

Model VC is designed for external use in cases where a tank cannot be utilized efficiently, mounted with either vertical or horizontal bracket.

Belt Grinder

Hammond Machinery Builders Inc., 1611 Douglas avenue, Kalamazoo, Mich., recently introduced a new improved 6-inch Wet-N-Dri abrasive belt grinder which can be adjusted from vertical to horizontal position while running. Its

belt tension and tracking device can likewise be adjusted while running.

The machine is totally enclosed for safety. It now incorporates a new heavy, large cast base and larger sludge pan and new pulley-motor mountings which are easily adjusted from outside the base. The Dri machine is arranged for an individual dust collector or for connection to an exhaust system. Work table can be adjusted to any desired working angle and is available as a bench or floor model. The grinder is equipped with tank and pump unit and can also be equipped for watermain connection only.

Turret Truck

Salsbury Corp., 1161 East Florence avenue, Los Angeles, reports seven new features have been added to its improved lift type turret truck. Among these is an easy-to-reach, hand-operated hydraulic lift lever at the right of the driver's platform.

At the left of the platform is the load-wheel brake pedal, which actuates inter-

nal expanding brakes on the two load wheels. Operator's platform of this newer unit is 4 inches wider than those of previous models.

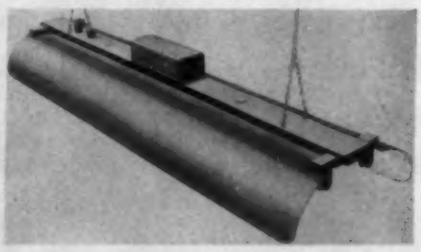
According to the company, one of the most important features of the truck is the fully enclosed primary drive chain. The lift platform also is now tapered to permit oblique angle entrances to skids. End rail on platform also is higher and heavier and is mounted in sockets for easy removal.

Bearing Puller

Armstrong-Bray & Co., 5364 Northwest Highway, Chicago, is offering a new bearing and battery terminal puller in two sizes known as Steelgrip No. 13 and 13A. Both (2-inch and 5-inch reach), feature drop-forged arms of heat treated steel. Their hooks are thin enough so they will fit between bearings and motor housings, and long enough to reach the bearing race.

Fluorescent Fixtures

Martin-Gibson Co., 999 Harper avenue, Detroit, announces a new 5000 line of industrial fluorescent lighting fixtures which features the Flexi-Coupler,

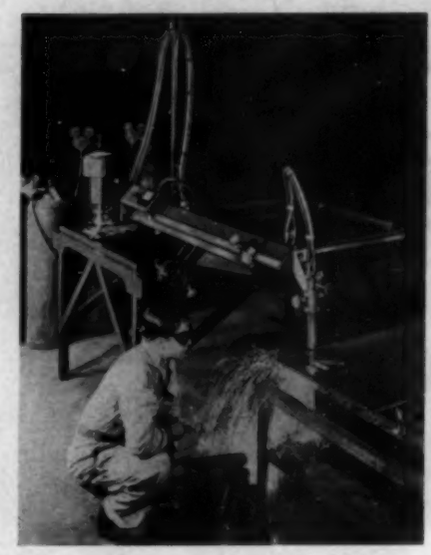


a device which permits spacing of fixture units as much as 6 inches apart, yet preserves all features of a continuous-run installation.

According to the company, the feature makes possible the use of only nine 100-watt fixtures in a 50-foot run instead of ten. New lightweight channels conforming to the government conservation order is another innovation of the line. Units are being offered in two 40-watt, three 40-watt and two 100-watt sizes after July 1.

Cutting Machine

National Cylinder Gas Co., 205 West Wacker drive, Chicago, is offering a new type JR shape cutting machine designed to handle cutting jobs from the smallest up to an overall size of 3 x 4. Adopting construction features from its large type "RR", the new unit has a uniform speed of travel from 2 to 35 inches



per minute which is maintained by the driving mechanism.

End positioning of torch—one of the JR's features—provides a flexibility for quick adjustment of the torch in relation to the end of the carriage, making it unnecessary to place the plate to the exact position on the cutting table, it is reported. A hand-wheel provides micro-adjustment of the torch to the starting position. Other features consist of templet and manual tracer and circle cutting attachment. The tension and driving rollers grip the templet and follow its exact contour so that the shape is automatically cut out of the plate by the torch.

Fingertip control of the manual tracer allows accurate tracing of the master drawing. The drive wheel holds automatically to any desired straight line without guidance. The circle cutting attachment cuts any circle from 3 to 36 inches in diameter.

Flow Switch

Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., is offering a new

79 PARTS

HARDENED BY THIS "ONE MAN HEAT-TREATING DEPARTMENT"

THE COOPER-BESSEMER CORP., renowned builder of top-quality engines and compressors for vital war and peacetime equipment, is discovering how to reap the benefits of TOCCO Induction Hardening to the fullest extent. Its progressive engineers have scheduled 158 different parts for this versatile "one-man heat-treating department"; are already TOCCO-hardening 79 parts, 75 of which are pictured above. Highlights of these operations:

Sizes of parts vary from ½ oz. set screws to 186-lb. cross-head pins.

Materials include SAE 52100, SAE 4615, SAE 1112, SAE 1045, NE 8620 and Meehanite Metals.

Typical time savings: Formerly hardened 100 large wrist pins in 13.5 hrs.; now they TOCCO-harden 100 in 3.5 hrs.—saving 10 hrs. per 100 pins. Push-rod buttons formerly required 3 minutes, now 15 seconds. They're now TOCCO-hardening cams, valves and other parts in ¼ to ⅓ former time.

Typical production: In 12 man-hours, TOCCO hardens 1800 pieces—12 different parts—12 different set-ups.

Other benefits: TOCCO's localized hardening eliminates straightening, reduces grinding or machining. The compact, clean TOCCO machine affords favorable working conditions.

Our experienced engineers will show you ways in which TOCCO can improve *your* production.

THE OHIO CRANKSHAFT COMPANY
Cleveland, Ohio

TOCCO

World's Fastest, Most Accurate Heat-Treating Process

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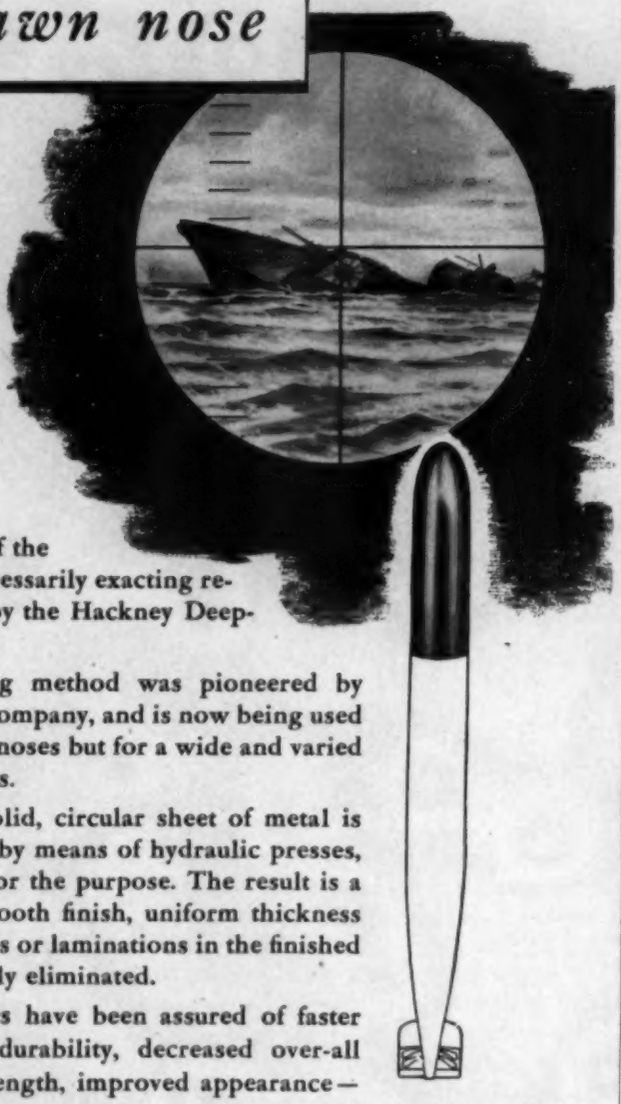
ANNEALING
BRAZING
HEATING for
forming and forging

Steel fish with a cold-drawn nose



It's the last chapter for a Japanese destroyer. And a Hackney Cold-Drawn Shape helped write it. The torpedo that sank this Axis ship had its nose deep-drawn to specifications by the Hackney Process. This torpedo nose is another example of how the Hackney Deep-Drawing Process is serving the war effort.

In the manufacture of the torpedo nose, the necessarily exacting requirements are met by the Hackney Deep-Drawing Process.

This manufacturing method was pioneered by Pressed Steel Tank Company, and is now being used not only for torpedo noses but for a wide and varied range of war products.

In the process a solid, circular sheet of metal is cold-drawn to shape by means of hydraulic presses, especially designed for the purpose. The result is a product having a smooth finish, uniform thickness and temper. Also flaws or laminations in the finished product are completely eliminated.

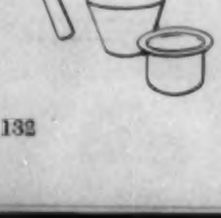
Many manufacturers have been assured of faster production, greater durability, decreased over-all weight, increased strength, improved appearance—and other important advantages—by using Hackney Deep-Drawn Shapes.

It may be that some of your wartime production problems or one involving your postwar products can be solved by a deep-drawn shape.

Pressed Steel Tank Company engineers will be glad to work with you. Write for full details.

Pressed Steel Tank Company

MANUFACTURERS OF HACKNEY PRODUCTS
General Offices and Factory · 1461 SOUTH 66th STREET
Milwaukee, Wisconsin



DEEP-DRAWN
SHAPES AND SHELLS

electro-thermostatic flow switch for resistance welding and other applications which detects the lack of proper cooling water required for adequate cooling of ignitron tubes.

The switch is designed for use where a liquid is used for cooling and where a smooth positive acting flow switch is required. It consists of a 100-watt transformer having a one-turn secondary short circuited through a piece of high resistance stainless steel tubing through which flows the water from the ignitron tubes.

A normally closed two-pole thermostatic switch is used. It is available in either a 1½ or 3½ gallons per minute size in both a 25 or 50/60 cycle 220/440 volt rating.

Furnished with a spring mounting to insure against excessive tightening of switch elements, the electro-thermostatic flow switch is being offered with or without enclosing steel cabinet, and all parts are easily accessible for replacements.

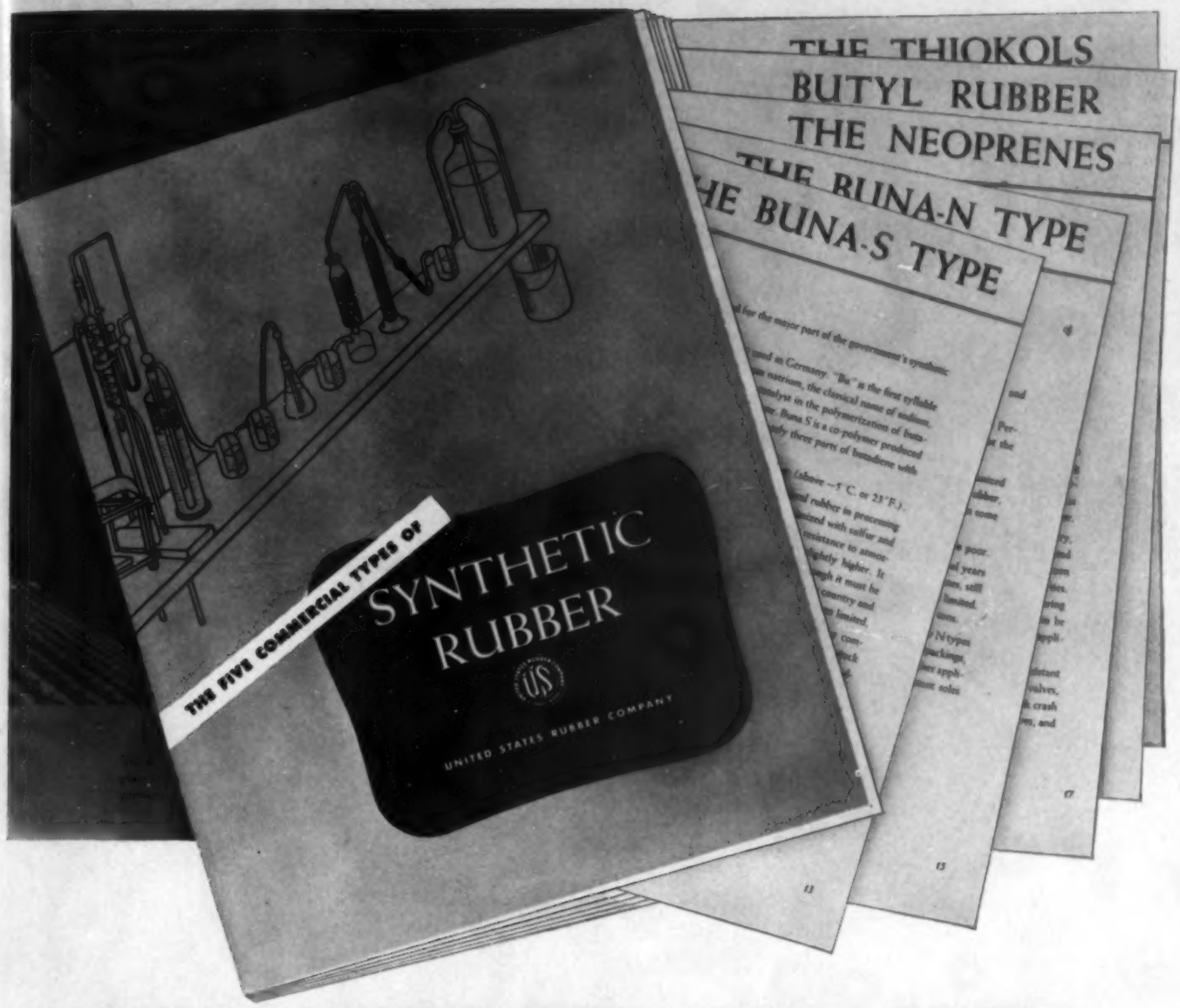
Surface Plate Stand

Challenge Machinery Co., Grand Haven, Mich., recently designed a portable, all-steel surface plate stand equipped with wheels for easy portability from one plant location to another. It affords a solid, arc-welded base. The stand is being offered in three standard sizes to accommodate 18 x 24, 24 x 24 and 24 x 36-inch surface plates. Units also are supplied without wheels.

Industrial Thermometer

Taylor Instrument Cos., Rochester, N. Y., announces a one-piece industrial thermometer designed to save critical materials. The one-piece case of the unit is shallower which makes it possible to see the mercury column through a wider angle of vision.

The chromium-plated bezel of the thermometer fits snugly into the grooved



WHAT IS SYNTHETIC RUBBER? HOW IS IT MADE? WHERE IS IT USED? HOW DOES IT COMPARE WITH NATURAL RUBBER? *You'll find the answers in this new book*

As the supply of natural rubber diminishes, undoubtedly more and more mechanical goods will be made of synthetic rubber... hose, belts, packings, molded goods, tank linings, and other rubber products used by industry.

Having worked in the field of synthetic rubber for more than twenty years, we know what each of the five types will do; what chemicals such as sulfur, carbon-black, or ultra-accelerators must be added, and how to compound them. We work with all five types; use the type available that is best suited for the purpose.

You can get an over-all picture of the properties and characteristics of synthetic rubber in the new book recently published by United States Rubber Company. A request for "The Five Commercial Types of Synthetic Rubber" made on your company letterhead will be filled promptly. Address your letter to Dept. 21.

UNITED STATES RUBBER COMPANY

Listen to the Philharmonic Symphony program over the CBS network, Sunday afternoon 3:00 to 4:30 E. W. T. Carl Van Doren and a guest star present an interlude of historical significance.

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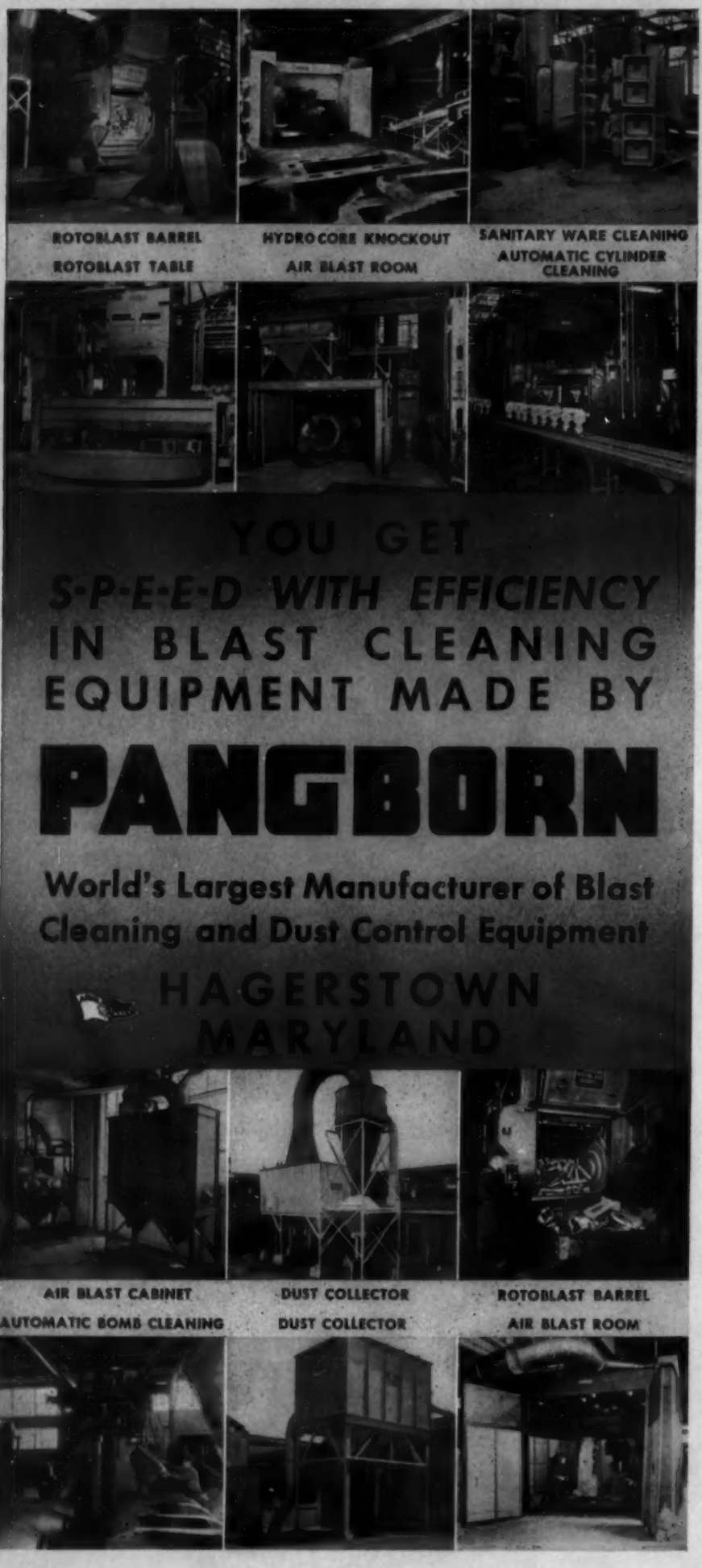
IN CANADA: DOMINION RUBBER COMPANY, LTD.



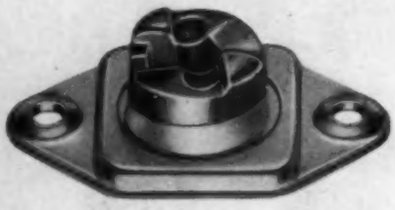
case in such a way as to hold the thick glass front securely against four wavy tension springs. Latter are fastened securely under the scale by screws. This construction can withstand vibration and severe shocks.

In addition, the new instrument is equipped with easy-reading Binoc tub-

ing. The tubing is being furnished in many combinations of straight and angle stems, with threaded or union connections, and in many standard temperature ranges, within the limits of −40 degrees Fahr. to +750 degrees Fahr. Standard scale lengths are 7 and 9 inches.

Floating Cam Collar

Camloc Fastener Corp., 420 Lexington avenue, New York, announces the addition to its line of fasteners a floating cam collar which allows large spot-



ting tolerances. It is adaptable to metal, plastic and plywood, and can be used with both slotted and wing-head stud assemblies.

Cable Connector

Jackson Products, 3265 Wight street, Detroit, announces a new fully insulated cable connector for arc welding that locks tightly and unlocks quickly. Its female section is soldered direct to cable lead, while the male section is soldered to the cable extension.

Removable insulators of the unit are

Winning the *"Battle of Production"* involves a lot more than a supremacy of materials, machinery and manpower. One major fire . . . or a small fire that results in crippling damage by the extinguishing medium . . . can halt or slow down war production in a dozen vital plants.

Cardox Fire Extinguishing Systems are guarding against these crippling fires in plants producing a wide variety of critical war products. For example, individually engineered applications are on duty in important plants producing such military necessities as:

Airplanes, Aviation Engines, Aviation Carburetors, Airplane Parts, Engine Parts, Plastics, Rubber Products, Processed Fabric, Tanks, Tank Engines, Cold Strip Steel, Armor Plate, Forgings, Solvents, Motor Fuel, Electric Power.

By instant smothering of fire and cooling of combustibles through the mass discharge . . . at high rate of flow . . . of low pressure, low temperature CO_2, Cardox Systems provide the all-important advantage of fast, complete extinguishment of large or small fires—without damage by the extinguishing medium.

Today, Cardox is concentrating its engineering and manufacturing facilities on two basic activities: (1) Designing and manufacturing of Cardox Fire Extinguishing Systems needed to make it possible for the Armed Forces of America to have more planes, guns, tanks and ammunition; (2) working with industry on plans to increase the efficiency of fire protection both today and after the war.

If you would like more information, write on company letterhead for Bulletin 873.

CARDOX CORPORATION
BELL BUILDING • CHICAGO, ILLINOIS

District Offices in New York • Washington
Detroit • Cleveland • Atlanta • Pittsburgh
San Francisco • Los Angeles • Seattle

★ *BUY WAR BONDS* ☆

How Cardox Systems Protect War Industries

- Timed discharges, as needed, through built-in piping systems . . . supplied instantly from a single storage unit holding tons (if required) of liquid Cardox CO_2.
- Mass discharge of Cardox CO_2 "knocks out" fire, by . . .
- Reducing oxygen content of the atmosphere below the concentration necessary for combustion, and . . .
- Cooling combustibles and fire zone below ignition temperature . . .
- Extinguishing fire quickly and completely *without* damage from extinguishing medium.

CARDOX—CO_2 Systems with Enhanced Fire Extinguishing Performance

A. Uniformity of CO_2 characteristics.
B. Extinguishing medium with uniformly greater cooling effect.
C. Accurate projection of CO_2 through greater distances.
D. Timed discharges, as needed, through built-in piping systems . . . supplied quickly from a single tank holding tons of liquid Cardox CO_2.

MASS DISCHARGE OF CO_2 · ENHANCED COOLING EFFECT · CENTRAL STORAGE UNIT · AMPLE CO_2 RESERVE · ENGINEERED SYSTEMS · MANUAL OR AUTOMATIC CONTROL

CARDOX

NON-DAMAGING FIRE EXTINGUISHING SYSTEMS

PAGE for WIRE

Today's production of PAGE WIRE, of course, is directed to the war effort and to essential industry—whether it be Stainless Steel Shaped Wire, Carbon Steel Shaped Wire, Welding Wire or such general items as Spring Wire, Bond Wire, Telephone Wire, etc.

As examples: (1) the springs used in a rifle that has attained a world-wide reputation for its performance in battle, are Page Stainless Steel Spring Wire; and (2) a special electrode developed by Page for welding armor—a contribution to the production of tanks.

★ ★ ★

Although completely occupied with the war effort, you will find our organization well able to work with you on plans you may have for the use of wire after the war.

PAGE STEEL AND WIRE DIVISION

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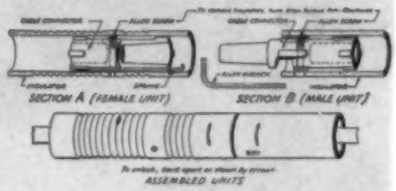
securely held in position with Allen screws. Connection is made by inserting male section into female section. Thus with a twist, the locking spring rides the



cam into position holding both sections tight.

Female section of the connector, which is known as the "Quik-Trik", when installed on a cable lead, may also be used as a holder handle and connected directly to the "stinger" end of a Jackson model TA holder.

Metal Saw

E. C. Atkins & Co., Indianapolis, is offering a new high-speed steel saw for slotting super-charge wheels and many other kindred operations, sawing ferrous and nonferrous metals where accuracy is a first requirement. It is made 0.062-

inch on tooth edge by 0.052-inch at mandrel. Each tooth has a relief clearance ground at the back of each tooth to the depth of the gullet, which allows for sufficient clearance where tolerances as close as 0.0002-inch must be maintained.

Toggle Pliers

Detroit Stamping Co., 359 Midland avenue, Detroit, recently added to its line new No. 455 toggle pliers for holding piping, tubes, rods or other cylin-

drical parts during manufacturing operations. The pliers lock into position and hold securely at any point within their gripping range, and are easily and quickly released.

"Colloidal" Fuel

(*Continued from Page 99*)

of the boiler, then followed the usual vertical baffling, crossing the tubes twice more to reach the damper outlet at the top of the tubes at the rear.

Test Operations: The boiler was first operated on oil to establish normal operating characteristics. It was then operated continuously on colloidal fuel. Ratings from about 40 to over 200 per cent were carried without difficulty, but for a considerable part of the test the boiler was operated at about 100 per cent of its rating. At this rating, it was found that the suction at the oil pump dropped from about 1.5 pounds per square inch pressure for oil to 4 inch vacuum for colloidal fuel. The pressure at the oil control valve was maintained for both fuels at about 30 pounds per square inch. At the burner the pressure for oil was practically zero; for colloidal fuel it was about 2 pounds per square inch. The steam consumption increased about 70 per cent.

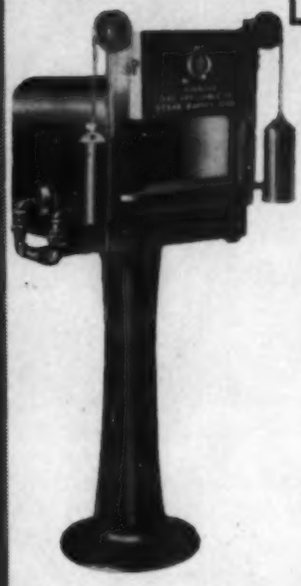
The load on the pump increased. Under one set of operating conditions this load was about doubled. When colloidal fuel is being considered in present plant equipment, thorough attention should be given the problems of increased suctions, pressures and loadings on pumps. Pump capacities may be lowered.

Colloidal fuel has considerable abrasiveness. It acts something like a lapping powder. It is doubtful, however, if this characteristic would necessarily be a serious handicap to successful operation. Equipment affected should be watched and repaired as found necessary. There was wear on the rotary pump in the heater pump set, most of the wear being at the spindle. No repairing, however, was found necessary during the run. There was also some cutting at the burner tip.

Settling: When colloidal fuel is being considered, the question always arises as to the possible settling out of the coal from the mixture. This depends on many factors, such as fineness of the grinding of the coal, the type of oil, the temperatures involved, and the agitation or movement given the fuel. Undoubtedly the finer the coal is ground the better it will remain in suspension. As a practical matter, however, it is desirable not to grind the coal any finer than it is absolutely necessary.

Where most settling is apt to occur is in the heater. At this point, parts of the fuel are heated much higher than the average temperature of the fuel leaving the heater; the higher the temperature, the more the settling expected. In general, it is best not to have the fuel any hotter than necessary at any point in the system up to the furnace. Operating routine can

Sure! You Can Get Two Weeks' Delivery on Johnson FURNACES



No. 130A Hi-Speed Steel Heat-Treating Furnace

This speedy furnace is available in two temperature ranges. Use the 6-burner unit for heat-treating high speed steels 1800° to 2400°, and the 4-burner unit for steels heat-treated at 1400° to 2000°F. Counterbalanced door opens upward, allowing tools to be placed or removed without fully opening door—thus preventing temperature drops. Pyrex glass peek-hole in front door allows operator to watch process without opening the door. Furnished with G.E. motor and Johnson Blower. Firebox 7¾" high, 13" wide, 16½" long. Lined with hi-temperature insulating refractory. 4-Burner model, $295.00. 6-Burner model, $325.00.

ALL PRICES F. O. B. FACTORY

No. 130 Hi-Speed Furnace: Firebox 5½" high, 13" wide, 13½" long. $248.00

No. 575 Pot Hardening and Melting Furnace. Pot size 14" dia., 20" deep. 8" insulation. $375.00

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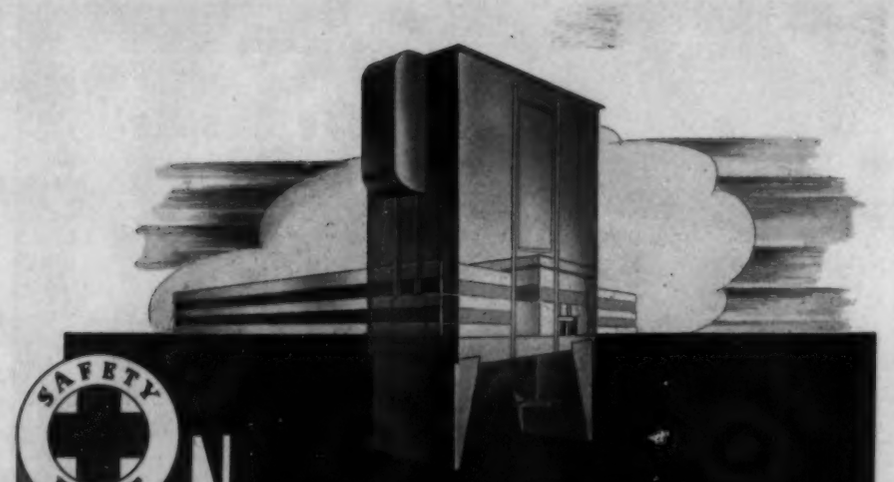

SAFETY FIRST

No Safety Program Is Complete Without *Efficient* Dust Control

DUST is perhaps the most cruel and treacherous safety peril of all.

Most other hazards are localized. Usually they threaten individuals singly. And when they strike the effect is immediate and visible.

Dust, however, threatens everyone within its reach. It attacks gradually and unseen, but its effect can be devastating.

That is why the dust control problem in your plant should be so carefully studied. Do not regard it with complacency. It is the most important factor in your entire safety program.

If you need counsel, write us and we will put a qualified dust control engineer on the job at once. Also write for our latest catalog No. 72, describing American high-efficiency dust control equipment.

AMERICAN
FOUNDRY EQUIPMENT CO.
509 S. BYRKIT ST., MISHAWAKA, IND

ARMY (E) NAVY

TRADE MARK
THE AMERICAN MOLDER

AMERICAN HIGH EFFICIENCY **DUST COLLECTORS**

be arranged to clean the heater as found necessary. If there are two heaters, they could be used alternately.

On the tests of the Atlantic Refining plant, it was found unnecessary to clean the heater on any of the runs that lasted about 7 days each. There was appreciable accumulation, however, in the heater when the 88-per cent and 95-per cent coal through 230 mesh were used; there was practically none when the 99-per cent coal was used. Some settling in the tank occurred with the 88-per cent coal but none with the 95 and 99-per cent as long as the storage tank was kept around 85 degrees Fahr.

No settling or clogging was experienced in the lines, although they were relatively long. There was some clogging in the meters and screens. Occasionally, throughout the day, the oil control valve tended to clog, but it could be readily cleared by opening it wide quickly. None of these difficulties were of moment. No boiler shutdowns occurred from operating troubles.

No difficulties arose in burning the fuel in the furnace with the steam atomizing type of burner. The flame responded smoothly to changes of boiler load and to variations of the quantity of air used for combustion. It could be controlled with the same ease as fuel oil. The carbon dioxide content of the products of combustion could be carried as chosen up to about 16 per cent with no carbon monoxide. Burning colloidal fuel after it is in the furnace does not present much of a problem. Experiments are now under way on the rotary cup-type of burner, which thus far has shown good combustion.

Ash Deposits: Troubles from the ash of the coal in the furnace were less than had been anticipated. The use of pulverized coal has supplied a vast amount of information on the action of ash in boiler furnaces and passes. It is not desirable to re-explore this field to any great extent in connection with an emergency fuel.

If a plant operator wishes to estimate about how much trouble he might have from ash, what those troubles are and how they can be met, he might visit a few pulverized coal burning plants that are similar to his plant and operating with similar coal at about the same loads. In general he should expect much less ash troubles. After about one week's operation, there was no dripping or slagging. The fly ash on the tubes was cleaned without difficulty every 8 hours during the test by the boiler soot blowers.

About the same boiler efficiencies were obtained with both oil and colloidal fuel.

Inquiries regarding additional details of these tests should be addressed to the Bureau of Mines, Washington.

More Fire Power

(*Continued from Page* 102)

or assuming that ultimately we may be able to get a 5 to 6-inch shell away from a plane to an enemy aerial target and have this shell hit the plane once, we would then bring the plane down with a firepower that may have been a fraction of that of the Beaufighter I.

To most observers in recent years and months, it appeared that every known weapon should be used and none overlooked, with an open mind for new ones.

Results Vindicated Experts

The magnificent results of both our land and carrier based fighters as well as our heavy bombers has vindicated all the confidence American aviation experts had in our planes. An analysis will show that the marked success of the Flying Fortresses has been due in large measure to the increased number of gun positions, and consequently greater number of guns that could be brought to bear from any point of the plane, in lesser measure to clever tactics employed in mass air raids. Among these tactics are certain types of formation flying which enables several of the big bombers to concentrate their combined fire power on fighters making attack runs upon any one of them. With the possibility of bringing up to seven machine guns to bear on an enemy fighter from one fortress, (actual number of guns is more), we can multiply seven by the number of bombers in any formation close enough to each other to engage in common defense and arrive at a figure ranging anywhere from twenty-one to perhaps forty-two or more machine guns. No wonder we have shot down scores of German and Jap fighters without any serious losses to our Flying Fortresses.

Another advantage in favor of our multi-gunned bombers is that the gunners can fire their guns at an enemy fighter for a longer period than he can fire at them. The enemy can only fire while he is diving on the bomber, and then he must pull up and swerve away. Our guns are spitting at him while he is taking his run at us, and following him as he flashes by overhead and on the other side by opposite gunners and by the upper and perhaps the forward gun turret.

A point to remember also, is that the larger aircraft such as our heavy bombers can take shell fire from enemy fighters and in most cases survive these attacks. Naturally, some planes will come back with gaping holes in wings and fuselage, one or more engines out of commission, and with perhaps several of the crew wounded or killed. But they will come back, and this fact alone means that enemy losses in planes and

PARTIALLY due to this 15 ton Euclid Crane in the plant of the Maryland Drydock Company of Baltimore, MORE POWER in a greater number of vessels moves into the "bridge of ships".

It combines two essentials—SPEED to meet production schedules and SMOOTHNESS OF CONTROL to facilitate assembly operations.

Loads can be raised or lowered as the trolley moves across the bridge while the crane travels speedily lengthwise of the building. The operator has remarkable control in lowering engine crankshafts, cylinders, etc. slowly and safely into position during assembly operations. Greatly appreciated is the auxiliary hoist for more efficient handling of light loads.

Other Euclid features include: the incorporation of: liberally proportioned parts throughout, the best type of antifriction bearings, advanced methods of lubrication and quick, easy facilities for inspection, adjustment or repairs. These features combine to afford a long life of service with remarkable freedom from shut-downs and repairs.

THE EUCLID CRANE & HOIST CO.

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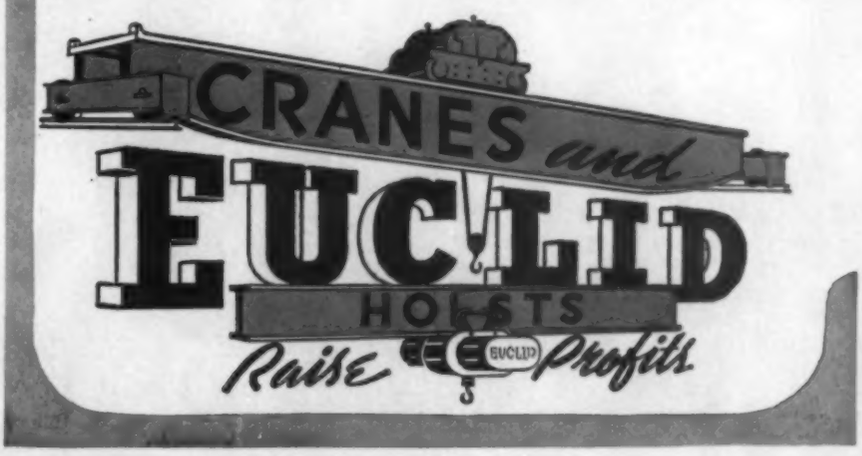


Loading Another 5 TONS of ARMY POWER

KEYSTONE Wire

Valuable time is gained loading this 5-ton package of Diesel power. A Tournacrane, equipped with several hundred feet of rugged cable, swings it quickly and easily onto the railroad car. Then comes another and another—ready for a quick trip to a battle area.

In the large number of such cranes located at key points, wire is at war. Wire mill production plays an integral role in planes, tanks, guns, ships and ammunition, too.

In these unglamorous ways, Keystone is devoting a major share of production to speeding Victory. Then we hope to be able to meet, at least partially, a towering, pent-up *civilian* demand.

In the scene above, three major uses of wire mill production are indicated: welding rod in producing the crane and tractor, rope wire for the cables, chain wire for the sling.

KEYSTONE STEEL & WIRE CO.
PEORIA, ILLINOIS

Special Analysis Wire for All Industrial Uses

SAMSON SPRING WIRE

Continuing the Victory depends on MORE SCRAP!

men must run in much higher ratio than ours.

But, it will be argued, the enemy may also be expected to employ heavy bombers with increased armor and heavy fire power. How can we expect to bring them down? The answer lies in our faster planes and better pilots, in our newest fighter creations, among which the Republic Thunderbolt, with eight .50-caliber guns in the wings, with heavy armor protecting the pilot, with high rate of climb and unsurpassed ceiling; in the British Typhoon with similar characteristics, both of which planes are in high gear production.

Secret Projects Answer

The answer lies in the many secret projects being developed at Wright Field, some of which will be ready within a few weeks, some within a few months, and some of which are long range projects which are destined for fulfillment in a year or two. The Army Air Forces have already revealed in off-the-record conferences with American newspaper men on the spot that some arms being worked on in our Army technical laboratories represent amazing advances in aircraft ordnance that will definitely upset the apple-cart of enemy air resistance. What these weapons are cannot even be hinted at here.

Two years ago our aircraft, both fighters and bombers, did not have enough fire power. Today, they definitely have it. Tomorrow they will surpass anything the enemy may have. On this point, we can rest assured.

Welding Aluminum

(*Continued from Page* 110)

quired a lower consumption of power over a longer period of time. Magnetic-energy-storage units provided the answer to this problem. In such equipment the welding energy is stored in an inductor transformer by establishing a direct current of from 100 to 400 amperes in the primary circuit of the transformer. When this current is interrupted by a magnetic contactor, a high value of current is established momentarily in the secondary circuit flowing through the work being welded. In from 0.01 to 0.05-second this current falls off to a low value.

Pressure Can Be Varied

Magnetic-energy-storage spot welders are equipped with an electrode pressure system that allows the pressure to be varied during the progress of the welding. Excellent welds are produced by this means while the direct current, usually obtained through rectifying a 3-phase 440 or 220-volt shop supply, brings about a maximum power demand that

is but 0.1 that required for an equivalent alternating-current spot welder. This reduced demand results from drawing less power for a longer period of time.

Condenser-energy-storage welding works on somewhat the same idea of lower power demands through the employment of static condensers to store the welding energy. In this type of welder 3-phase shop power is stepped up in voltage and rectified so as to charge the condensers to a voltage from 1000 to 3000 volts. When this bank of charged condensers is connected to the primary of the welding transformer, welding current in the secondary rises to a shop peak and then dies away at a slow rate. See Fig. 1.

When welding with the condenser-energy-storage equipment, either a constant electrode pressure or a constant pressure followed by an increased pressure is used. These units produce welds of consistently high quality. Once more the power demand is about 0.1 that of the equivalent alternating-current spot welder.

Fig. 2 shows the relationships between power, pressure and tip-flat diameter for welding 24S-T Alclad with electrostatic stored-energy machines.

Keep Arms Short

No matter what type of welding machine is selected, the power demand is a function of the thickness of the material to be welded and the throat area of the welding machine. For this reason the cost of the welding equipment and the power required may be kept at a minimum by specifying the shortest possible length of arms together with no greater arm spacing than the work necessitates.

Both tables II and III give typical kilovolt-ampere demands for both alternating-current and stored-energy welders.

No small part of the successful welding of aluminum alloys is the electrode tip which is called upon to perform three essential functions—carry the current to the parts being welded, supply the pressure required for welding and conduct the welding heat away from the weld zone. One, and sometimes both, of the electrodes is shaped to bring the greatest possible concentration of heat to the weld area.

Dome shaped electrodes with a 1 to 2-inch radius or conical electrodes with a 158 to 166-degree included cone angle are oftentimes used. Stored energy welders frequently call for a cone angle of 130 to 160 degrees in a truncated cone having a flat spot with a diameter equal to twice the thickness of the material being welded plus ⅛-inch. The electrode on the other side of the work may be the same shape or it may be flat, in

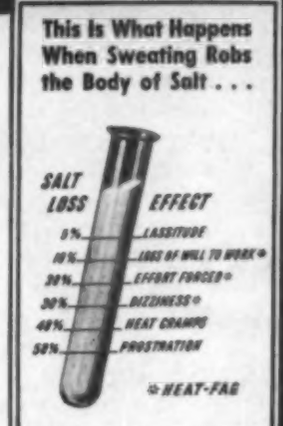
Salt Brings Back That Will To Work

Heat-Fag is an ever-lurking enemy in every shop where toil and sweat are writing new production records. Body salt lost by sweating must be replaced or Heat-Fag sets in. Lowered vitality, fatigue, production slowdowns, accidents and absenteeism can often be laid at the door of this insidious force.

The finger of Accidents is always beckoning to the fatigued, inalert worker. That's why Heat-Fag, ever present when men sweat, takes such a heavy toll in man-hours lost.

Salt tablets restore the body salt lost through sweating. They help keep men alert . . . efficient.

In leading industrial plants, salt tablets are a "must" for men who sweat. They maintain the will to work through long, hard, hot hours.



MORTON'S Heat-Fag SALT TABLETS

QUICK DISSOLVING
(Less than 30 seconds)
This is how a Morton Salt Tablet looks when magnified. See how soft and porous it is inside. When swallowed with a drink of water, it dissolves in less than 30 seconds

Case of 9000, 10-grain Salt Tablets, $2.80
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Place MORTON'S DISPENSERS at all Drinking Fountains.
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WHAT'S AROUND THE CORNER?

This question never was an easy one to answer. And a Global War doesn't make the answers any easier to find.

Yet, to many executives, as far as their own businesses are concerned, it is not unanswerable.

Some, with completely converted plants are now planning to get back into their former fields. They are redesigning their old products . . . utilizing new processes, new methods and new materials. They are laying plans for revamping their facilities to the postwar job.

Others have discovered new product opportunities in their war production setups. They plan to utilize the "know-how" which they have developed during the war.

Still others are making equipment surveys. They know that changes made for war production will affect their carefully planned peacetime equipment balance and influence a decision as to the volume of prewar products to be included in postwar production plans.

In such studies, management has often discovered the real value of the outside viewpoint. Our organization, because of its background of broad and unusual experience, has been helpful. May we discuss postwar planning with you?

Geo. P. Trundle Jr.
President

THE TRUNDLE ENGINEERING COMPANY

Consulting Management Engineering

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which case the diameter will vary from ⅝ to 1¼ inches.

A number of different copper alloys will serve the purpose, provided that they possess a hardness in excess of 65 rockwell B with electrical conductivities greater than 75 per cent that of pure copper. High hardness means that the electrodes will hold their shape under the heat and pressure of welding. Good electrical and heat conductivities are needed to keep the tips from overheating. In light service hard drawn copper tips have been satisfactory but alloys are indispensable for heavy duty.

Watch Electrode Capacity

Of course the electrodes should be large enough to carry the requisite current. At a rate of 40 welds per minute ⅝-inch diameter electrodes will carry currents up to 35,000 amperes with a welding time of 15 cycles. Higher currents and greater speeds can be accommodated with larger electrodes up to 1¼ inches in diameter. Likewise light service conditions permit the use of electrodes as small as ½-inch in diameter.

Electrode tips are cooled either with water or a refrigerant. Water-cooled tips are used with alternating-current welders for from 15 to 80 welds before the tips need redressing while stored energy units will make from 200 to 300 welds before the tips need attention.

Refrigerated tips are good for several times this number of spots before they require attention. Pickup of aluminum alloys the surface of the tip and may cause sticking if proper maintenance is not a routine part of the welding procedure.

Tips gradually become larger during use, so a systematic procedure should be established for tip maintenance and reshaping. Since tips are readily interchangeable, many plants require that tips be removed and reconditioned after a definite number of spots have been welded. The tips are restored to correct shape in a lathe and all welds are made with tips of regular dimensions leading to regular weld production. There is nothing so certain to upset the relationship between current and weld size as an overgrown tip that has resulted from improper care.

(*Continued Next Week*)

Electric Steelmaking

(*Continued from Page* 114)

residual manganese should be approximately 0.20 per cent. In other words, the bath is contaminated with oxidized silicon, oxidized manganese and perhaps some oxidized chromium, besides being saturated with iron oxide in approximate equilibrium with the oxide in the

If You Use a SEPARATE SOLDERING FLUX You'll Get Better Results with KESTER

• Kester Soldering Fluxes—salts, paste or liquid—are made with scientific care to meet the most exacting production requirements. They're compounded to give maximum fluxing results, and they've proved their efficiency over and over again in the 44 years they have served industrial users.

• For example, Kester Soldering Paste is made by the viscosiforming process, which makes it uniform in fluxing quality. Fluxing ingredients are evenly and finely divided.

• Whatever form of flux you use, look for quality and best results to the same experience and laboratory skill that have made Kester Cored Solders standard for every industrial use.

• When ordering fluxes, *specify* these Kester products:

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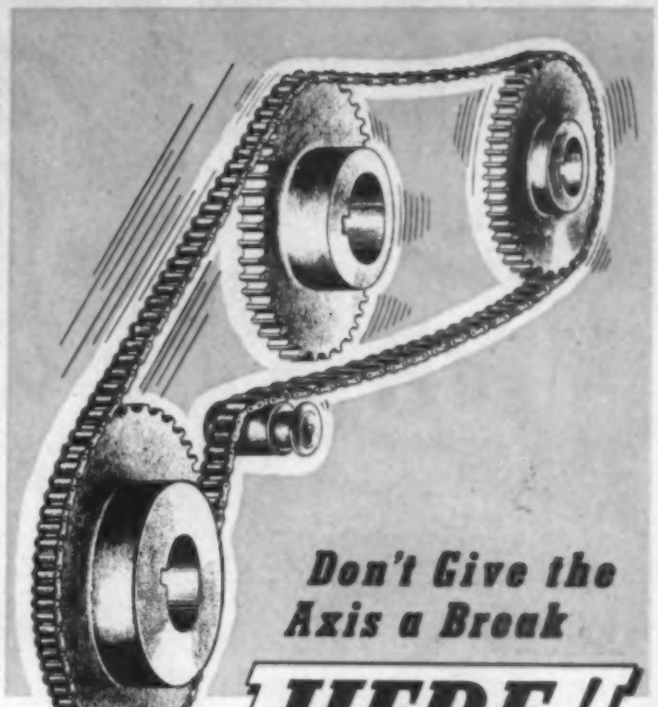
STANDARD FOR INDUSTRY



Don't Give the Axis a Break HERE!

Keep Equipment Working with Jeffrey Maintenance Parts

Whenever a faulty part stops production, chalk up a point for the Axis. Even the smallest break can act as a brake on the entire production line.

Jeffrey maintenance parts can take it. They have the toughness that holds up giant-like under the hardest going. That's why the word has gone out in hundreds of industries and plants: "Specify Jeffrey."

Always try Jeffrey first. Jeffrey "in stock" supply of maintenance parts is kept as complete as present conditions permit.

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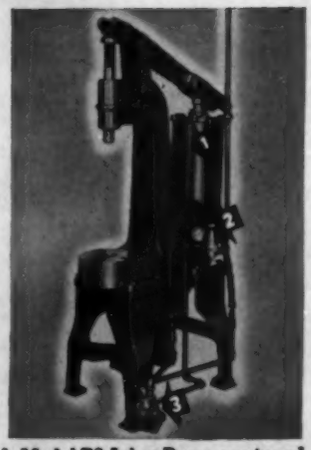
Write for Bulletin 46-S describing the complete range of types and sizes of Hannifin Arbor Presses.



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slag. In order to produce steel of the desired cleanliness we must remove the insoluble oxides and reduce the others to the metallic form, eliminating the oxygen from the bath. Some of the iron oxide in the bath can be removed by reduction with carbon, which is most desirable since the product passes out of the bath as a gas. Elimination of the silicates generally can best be done by combining the manganese oxide and the silica to form manganese silicates. These, when of large size, will rise into the slag if the bath is sufficiently fluid.

One method of accomplishing this is to use a manganese or spiegel reboil which combines the stirring effect of the carbon boil with the introduction of sufficient manganese to reduce most of the iron oxide and form manganese oxide, which in turn combines with the silica. These reboils are desirable in promoting a less oxidized bath and help remove silicates from the bath. However, their effect is not permanent, and the presence of the oxidizing slag tends to re-oxidize the bath. For this reason, reboils are usually timed to be far enough ahead of the slag-off period to insure the maximum removal of the silicates to the slag, but not so far ahead that the action has begun to reverse and oxide has once more begun to build up in the bath. It has the disadvantage that manganese is lost with the slag when it is removed at slag-off.

One melter, with exceptionally good results, starts the de-oxidation period as soon as the melt-down laboratory reports indicate satisfactory carbon and manganese, by shutting off the power and dipping the hot electrodes into the bath for a few minutes, or until the action which indicates reduction of iron oxide in the bath stops. The electrodes are then raised. Some oxide has been removed as a gas and the bath will show little if any carbon pickup. As soon as the power is again applied, the full manganese addition is made, as is indicated by the melt-down test. The immediate result of this is that there is a pickup in carbon and manganese with a high concentration of manganese oxides in the bath, which, because of the action and the temperature, tends to combine with most of the silicate present. A considerable portion of the manganese silicates and the manganese oxide passes into the slag and is lost in the subsequent slag-off.

With this melter, slag-off starts in approximately five minutes after the manganese addition. The value of adding the manganese at this point is much greater in steels which specify a manganese above 0.50 per cent, and especially where the carbon is of a low or medium specification. One advantage of the manganese reboil and the addition

of the manganese just before slag-off is that it insures uniform temperature and also permits bringing the temperature up to the point where the bath fluidity is increased and the removal of insoluble nonmetallics greatly facilitated. If timed correctly, only approximately 20 per cent of the manganese is lost in the first slag, and with the increased temperature and high manganese the chromium recovery from the slag is high.

The removal of the first slag in electric furnace practice indicates that the time has come to complete the deoxidation. In many plants partial deoxidation has already been accomplished by the manganese reboil, and the iron oxide in the first slag at this time is approximately the same as in the slag of a well finished basic open-hearth heat. The temperature at this point is extremely important. In my opinion, it should be above 2900 degrees Fahr. so that the metal will be of sufficient fluidity to promote the removal of the nonmetallics. This is important, because the bath becomes relatively viscous at temperatures below 2900 degrees Fahr. especially with steels low in carbon. The temperature and the condition of the bath at this time are most important factors in the production of steels which must meet difficult cleanliness tests, and sufficient action and high temperature in combination with high residual manganese are essentials.

One of the first steps after slag-off, in preparing the bath so that it will be in equilibrium with the second slag, is to introduce the manganese at this point, followed by a strong deoxidizing agent. If most of the manganese was added before slag-off, the bath should already be as well deoxidized as can be done with manganese. In any event, the addition of a sufficient quantity of a strong deoxidizing agent, such as aluminum or one of the silicon-aluminum-calcium combinations, just to take care of the iron oxide present, will be found desirable. The first effect of this addition is to reduce the iron oxide in the bath to a low level so that little difficulty will be found in getting the bath in equilibrium with a low oxide slag.

There is no reason why, after this addition is made and diffused, that all of the major alloy additions should not be made. These would include the necessary chromium, nickel and molybdenum additions to meet the final specifications. If the manganese has not been added prior to slag-off, it should be the first addition made after slag-off. Whatever manganese is oxidized at this point will be reduced and recovered from the second slag. It is believed that the early addition of the alloys, especially the ferroalloys, is important because it provides the time necessary for the elimination of nonmetallics which are introduced into the bath with them.

Before the slag is added, high power can be applied to the bare bath, and the temperature increased, so that the chilling effect of the heavy alloy addition can be overcome. The increase in surface temperature is an important factor in promoting a quick fluxing slag, and the chilling effect of heavy alloy addition later in the heat is eliminated.

After the major alloy additions, the second slag, which has already been premixed, is added to the surface of the bath. This slag consists of a mixture of lime, spar and coke, and in some cases silica sand. The amount and proportion used varies considerably from one plant to another, but approximately 2 per cent of the charge weight seems to be satisfactory in most cases. Use of silica sand is important in promoting fluidity and when not used to excess is generally recommended. The second slag is maintained low in oxide by frequent surface additions of coke breeze, but ff the bath must be kept under a low maximum carbon, powdered ferrosilicon is used instead of coke to prevent carbon pick-up.

The object of the slag-off is to remove

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as completely as possible all of the first slag, containing the relatively high iron oxide and silica. It is important that this be done thoroughly, since any remnants of the first slag will delay the formation of a second slag having the required low oxide and high lime ratio. It must be kept in mind that the primary objective of the second slag is the best possible equilibrium between the molten steel and a slag of the lowest practical iron oxide content. Obtaining this equilibrium between slag and molten steel is a problem of contact between the two.

Perrin in France, Yocom in America, and other workers have shown that this equilibrium can be obtained in a matter of a few minutes if a special attempt is made to insure thorough mixing of the steel and the slag. The same problem exists in the first slag reduction of the phosphorus where the tendency of the bath in the electric furnace to become quiescent can be overcome by the action from the carbon reduction by the ore. This is important because of the need of an active ore boil as part of the reduction of the phosphorus. It has been known for some years that violently oxidized metal, after the dephosphorizing slag was removed, could be reduced to a properly killed steel of remarkable freedom from inclusions by rapid and violent agitation with a suitable slag free from oxide or iron.

In the electric furnace, because of its approach to equilibrium, there is a close relation between the oxide in the slag and the oxide in the steel itself, so that if we are to obtain quickly a low oxide in the slag, it is important to reduce the oxide in the steel. In other words, much time can be saved if we reduce the iron oxide in the bath to a low point as soon as possible, and preferably by means of manganese. The low oxide in the slag is not only essential to insure low oxide in the steel, but its primary function is to facilitate the removal of sulphur. All of the manganese and chromium oxide, formed when ferromanganese or ferrochromium is introduced into the oxidized bath, will be reduced with the approach of the iron oxide in the slag to the final low figure.

Under the second slag, where the power applied is low, the tendency of the bath to become quiet must be overcome by some means if we are to eliminate the marked difference in temperature between the surface and the bottom. This difference in temperature, due to lack of action, is a most important factor in promoting dirty steel and unsatisfactory etch tests. It is an important reason why the steel should not be held under the second slag any longer than necessary to get the iron oxide in the steel to the lowest possible

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point and the slag in a proper condition. There should be, apparently, some action in the bath as evidenced by working in the test box until the last ferrosilicon is added in order to eliminate the tendency of cold steel to stagnate in the bottom of the bath.

In some plants cement clinker is used after the additions, or even before the chromium addition, since this forms almost immediately a light slag of approximately the correct makeup. The cement clinker, in addition to a high lime-silica ratio, has approximately 5 per cent of alumina, which is considered of some advantage in the reduction of sulphur. In fact, the use of alumina in the form of bauxite, or aluminum dross, seems to have considerable merit when properly used in removing sulphur from the bath.

If the steel is sufficiently hot and free from oxide, the second slag should begin to shape up well in 15 or 20 minutes, and by the time the laboratory report on the first preliminary is back it should be in a condition to add the ferrosilicon. The timing of the addition of the ferrosilicon is one of the most important factors in the making of the highest grade steel. If the bath is not completely deoxidized there will be a tendency to form excessive silicate inclusions, which are difficult to remove. For this reason, the final silicon should not be added until equilibrium has been obtained between the bath and the slag, which should show on test an iron oxide content of approximately ½ of 1 per cent.

There are several schools of melting practice for constructional type alloy steels, with different viewpoints on the object of the second slag in electric furnace steel melting. According to my observation, based on watching different melting practices in many sections of the country, the most successful school is the one that believes that as soon as equilibrium is established the heat should be tapped. They believe that the first step after slag-off is manganese deoxidation, followed by more complete deoxidation with aluminum or silicon, and finally, as soon as the second slag starts to shape up, the completion of the deoxidation by ferrosilicon, leaving the aluminum addition for grain size control at tapping. The important control factor in this type of finishing practice is iron oxide in the slag. As soon as equilibrium can be reached with a slag of less than ¾ per cent of iron oxide and more than 65 per cent lime, the melt is ready for tapping. Aluminum addition in the furnace should be considered most carefully where super clean steel is required, especially if added before slag-bath equilibrium is obtained, and, unless the time, temperature, and bath condition permit cleaning up, the straight alumi-

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num addition for deoxidation should be avoided.

With the return of the analysis test, taken before the ferrosilicon addition, the carbon and manganese additions necessary to meet the chemical specifications are made and then the aluminum for grain size control, if required. During this time the power is increased, if necessary, to provide a tapping temperature of approximately 3000 degrees Fahr. on medium and low-carbon heats.

The time from slag-off to tap varies considerably from plant to plant, so that it is hard to specify a given time. Certainly the shorter the time the better, if deoxidation has been complete. Increasing the time under the low power after slag-off is conducive to dirty and uncertain heats. In one successful plant the average time from slag-off to tap on 60-ton basic electric furnaces is not over 75 minutes.

Choosing Slings

(*Continued from Page* 117)

pen to a wire-rope sling is to drag it over a concrete floor. A sling may be quickly ruined by such practice, especially where the sling consists of several ropes. Workmen are inclined to drag the sling along the floor by means of the ring or link, allowing the free ends of the ropes to drag. Severe wear usually results along one side of the eye in the end of the ropes, causing the rope to fray at this point, necessitating its replacement.

In the handling of our cast milling machine bases, we make use of the two parallel holes that are drilled through the top of the base to receive two shafts on which the machine head will be mounted. Since the inside of these drilled holes is finished to close tolerances as is also the front surface of this casting, the problem is to handle these castings and partial assemblies without damaging the finished surfaces.

For this purpose, we insert round maple rollers through these holes, each roller extending several inches beyond each side of the casting. We then hook the sling onto the ends of these rollers. Since the sling will rub against the finished side of the casting, we employ only manila rope for slings in this case.

We obtain these wooden rollers in diameters from 1½ to 4-inches and cut them to the lengths we want. The ends of each roller are marked with a streak of paint to show the direction of the grain. Before the load is lifted, these rollers are turned until these paint marks are vertical so that the load stress will be parallel with the grain of the wood.

All manila-rope slings are hung in a dry place, allowing air to circulate around them, thereby preventing rotting. These

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Helpful Literature

1. Mounted Wheels

Chicago Wheel & Mfg. Co.—64-page illustrated catalog shows, by actual size pictures, various styles, sizes and shapes of mounted wheels, steel cutters, saws and polishing wheels. Selection guide gives wheel specifications for finishing various types of materials. Also described are portable electric tools and accessories for use with mounted wheels and cutters.

2. Machinery Steels

Crucible Steel Co.—12-page illustrated bulletin on "Max-El" machinery steels contains handy data and stock information on carburizing steel, machinable steel, alloy steel and collet steel. Data are included on composition, machinability, tensile values, typical applications, availability and identification.

3. Surface Grinding

Blanchard Machine Co.—80-page illustrated booklet, "Work Done on the Blanchard," shows and describes typical examples of machining and finishing of flat surfaces on surface grinding machines. Wide variety of materials, sizes, limits and finishes are covered in various operations. Specifications are given for different model grinding machines.

4. Steel Weight Calculator

Heppenstall Co.—Slide rule type "Heppenstall Steel Weight Calculator" affords simple means for determining weight of known sizes of bars, sheets and other steel products. On back of scale is standard slide rule which permits division and multiplication quickly. Limited supply of this calculator makes it available free to only purchasing agents, engineers and those concerned with steel specifications.

5. Jig Borer

Fosdick Machine Tool Co.—20-page illustrated catalog is descriptive of "Fosdick" jig borers which are designed for precision boring and drilling on jigs, fixtures and production parts. Various models are shown and design features of different parts are treated in detail. Briefly described are radial, upright, and sensitive drills.

6. Aircraft Electric Motors

Dumore Co.—24-page illustrated bulletin No. 120 describes complete line of standard and special aeromotors ranging from 1/50 to ¼ horsepower. Actual size photographs, dimensional drawings, specifications and ratings are given. Applications and performance are presented for these motors which are designed for operating such equipment as bomb bays, wing flaps, landing gear and aerial cameras.

7. Milling Machine

Cincinnati Milling Machine Co.—20-page illustrated bulletin No. M-909-1 gives detailed specifications on "Cincinnati" No. 2-24 automatic rise and fall milling machine. Equipment is designed for production of parts where output and automatically controlled accuracy are important. Machine is equally adaptable for production of parts requiring conventional milling operations.

8. Die Steel

Firth-Stirling Steel Co.—4-page illustrated bulletin No. SL-2002 presents composition, characteristics, general, and special applications, heat treatment, drawing and expansion properties of "Cromoco" air-hardening die steel. Other products of this company briefly covered are high speed, tool and die, and stainless steels, as well as sintered carbides.

9. Grinding Wheels

A. P. deSanno & Son, Inc.—8-page illustrated bulletin, "Facts About Por-Os-Sway," explains difference in texture and operation of the cellular type grinding wheel which is adaptable to precision toolroom cutting operations on hardened tool and die steels, as well as for grinding operations of all types. These fast cutting wheels are claimed to be cool operating and durable.

10. Electrical Contacts

Fansteel Metallurgical Corp.—32-page illustrated data book No. C-1000 contains engineering data on complete line of electrical contacts. Information is given on contact engineering design, electrical contact materials and various styles of contacts. Selector chart aids in specifying proper contact material and optional material for special and standard applications. Other technical data are included.

11. Materials Handling

Factory Service Corp.—20-page illustrated bulletin, "The Turner System of Materials Handling Equipment," describes this system which uses transports, hand-lift hauling unit, bin sections and transport trays. Equipment is adaptable for handling bulk materials, as well as large or small parts.

12. Machine Tools

Ex-Cell-O Corp.—20-page illustrated bulletin No. 27121 contains specifications on line of machine tools and cutting tools. Among equipment described are thread grinders; boring, turning and facing machines; universal fixtures; carbide tool grinders; lapping machines; grinding spindles; cutting tools; hydraulic power units; drill jig bushings and precision parts.

13. Refrigerated Electrode

Frostrode Products—6-page illustrated bulletin No. P-43 describes design, construction and operation of "Frostpoint" permanent electrodes with replaceable finned "Frostcap" caps. It also covers "Frostpoint" adapter holders for converting any spot welder to refrigerated welding process. Color charts show coolant circulation, installation and method of cap replacement.

14. Micrometers & Standards

Davis & Thompson Co.—4-page illustrated bulletin on "Tubular Micrometers and Standards" gives data on these instruments which are available in 43 sizes ranging from 0 to 168 inches in capacity. Drilling and milling production machines are briefly described.

15. Records Control

Diebold Safe & Lock Co.—8-page illustrated bulletin No. AL-1321 is entitled "Cardineer Speeds Control." Text explains use of this rotary file for filing, posting and reference work. Typical installations of this record keeping system are shown and operation explained.

16. Waterproof Seal Tape

Mystik Tape Div., Chicago Show Printing Co.—4-page illustrated bulletin is descriptive of "Mystik" self-sticking cloth tape which is waterproof and pressure sensitive. This adhesive tape is particularly adaptable for packaging war materials and equipment in accordance with ordnance requirements.

17. Rivet Heaters

Mahr Mfg. Co.—8-page illustrated bulletin No. 175 describes line of gas or oil fired rivet heaters in portable or stationary models for operation on low pressure or compressed air. Specifications are given for various models and construction features are shown.

18. Controller

Foxboro Co.—8-page illustrated bulletin No. 240-1 shows design, operation and construction features of potentiometer indicating recorder-controller which affords sensitivity of control. Extremely small changes of temperature are detected and directly converted into control action, without mechanical loss.

19. Gage Block Care

Dearborn Gage Co.—8-page illustrated booklet, "How to Make Your Standards Last Longer," explains proper procedure for care of all types of gage blocks ranging from chromium plated to hardened steel gages. Removal of scratches and burrs with special stone is shown.

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20. Honing Machines

Barnes Drill Co.—16-page illustrated bulletin No. 121-H describes the "Barnesdril" honing process and gives complete details on self-oiling hydraulic vertical and horizontal honing machines. Process is used for finishing cylindrical bores and exterior surfaces of piston rods and shafts.

21. Machine Tool Control

Detroit Universal Duplicator Co.—16-page illustrated broadside, "What Is Duplimatic and How Does It Work?" shows cutaway, sectional view of this automatic machine tool control. "Duplimatic" provides fully automatic machine control for milling, turning, boring, shaping, die sinking and similar operations by converting variations in electrical impulses into hydraulic motion.

22. War Production

Caterpillar Tractor Co.—56-page illustrated bulletin No. 7767 is entitled, "How 'Caterpillar' Helps Fight World War II." Use of tractors and diesel driven equipment in war are told in pictures and text. Facilities of plant and various types of equipment manufactured are explained.

23. Broach Sharpener

Colonial Broach Co.—8-page illustrated bulletin No. CS1-43 is descriptive of new universal broach sharpening machine which is designed for handling both round and flat broaches. Various types of standard broaching machines are also illustrated, with information on range of available strokes and capacities.

24. Damping Capacity Tester

Baldwin Southwark Div., Baldwin Locomotive Works—4-page illustrated bulletin No. 109 explains design, operation and application of "Norton" damping capacity testing machine of torsion pendulum type with photographic recorder.

25. Tool Salvage

Eutectic Welding Alloys Co.—16 x 20-inch poster shows complete procedure required for salvaging many types of tools used in production of war materiel. Use of low temperature brazing alloys in repair of such tools as broaches, milling cutters, form tools, drills, saws and reamers is described.

26. Tapping Machines

Detroit Tap & Tool Co.—8-page illustrated bulletin on "Detroit Special Tapping Machines" covers both light and heavy duty series machines which may be varied in design to suit special conditions. Precision drive at base of lead screw eliminates normal "wind-up" encountered in other types of spindle drives.

27. Valve Grinding

Cooper-Bessemer Corp. — 6-page illustrated folder entitled, "Recommended Valve Seat Grinding Equipment," describes machines and tools best suited for grinding seats and valve faces in various types of "Cooper-Bessemer" engines.

28. Industrial Furnaces

Cooley Electric Mfg. Corp. — 4-page illustrated bulletin, "Electric Furnaces," describes various sizes and types of furnaces for industrial and laboratory uses. Equipment may be had with automatic or manual control in 3400 and 4800-watt models.

29. Floor Cleaner

W. H. Barber Co.—Two illustrated folders on "Absorb-Oyl" non-inflammable floor cleaning compound explain how this material may be used in industrial plants and similar locations for removing oil, grease and dirt from floors.

30. Presses

E. W. Bliss Co.—12-page illustrated catalog No. 10 is devoted to eccentric shaft straight-side presses which are extensively used in hot forging of brass, steel and other metals, as well as for many forming and embossing operations.

31. Electric Brakes

Empire Electric Brake Co.—6-page illustrated bulletin on "Magdraulic" electric brake explains construction and operation of this unit which requires only 2 amperes for operation. Drawings give dimensions of three stock sizes. Brake operates on direct or alternating current.

32. Electronic Equipment

Electron Equipment Corp. — 4-page illustrated bulletin No. 170 briefly describes line of electronic equipment which includes rectifiers, revolution-per-minute controls, converters, inverters and cycle changers. Data are given on various machines and their capacities.

33. Masonry Saws

Clipper Mfg. Co.—4-page illustrated bulletin No. 35-5 gives specifications on three models of "Clipper" masonry saws for heavy duty industrial use. These abrasive cut-off machines are particularly adaptable for trimming, cutting or shaping refractory and other types of brick.

34. Time-Pattern Controller

Brown Instrument Co. — 8-page illustrated bulletin No. 87-1 describes operation and application of "New-Matic" time-pattern controller which is designed for automatic regulation of temperature, pressure, flow and liquid level in accordance with predetermined time pattern for process and industrial operations.

35. Standard Steels

Babcock & Wilcox Tube Co.—6-page technical data card No. 119A gives combined standard steel lists of American Iron & Steel Institute and Society of Automotive Engineers. Types of steel, AISI and SAE numbers, and chemical composition limits in per cent are tabulated in readily usable form.

36. Cemented Carbide Dies

Carboloy Co. — 32-page illustrated catalog No. D-114 covers standard and special dies for drawing wire, bar, tubing and sheet metal. Standard rough cored dies for round hole wire drawing are available in 80 sizes up through 3.225 inch. Extruding dies for boltmakers have been extended to include from ¼ to ⅝-inch bolts. Other lines of dies are similarly expanded in available sizes.

37. Open Wiring

Delta-Star Electric Co.—12-page illustrated bulletin No. 4210 is entitled, "Saving Copper." Results obtainable through use of open wiring in industrial plants are discussed. Data are given on open wiring as applied to war production operation. Specifications are presented on single and three conductor cable supports.

38. Mounted Wheels

Bay State Abrasive Products Co.—4-page illustrated bulletin "Bay State Mounted Wheel & Points" explains how tools are formed from uniform blanks and mounted to run absolutely true. Vitrified, resinoid, rubber and other bonded types are available in many shapes and sizes.

39. Machine Design

W. F. and John Barnes Co.—4-page illustrated bulletin, "An Introduction to 3 Point Design," covers factors to be considered in design of special machines for drilling, tapping, boring, milling or honing operations. Facilities of this company for designing and manufacturing special machines for above purposes are briefly explained.

40. Dumping Car

Easton Car & Construction Co.—1-page illustrated bulletin No. 177 gives dimensions and specifications of model 501-T rocker dump car which is designed for universal use in handling dry bulk materials such as coal, sand, ashes or industrial parts where loading is done by hand for manual or power haul.

41. Magnetic Separators

Dings Magnetic Separator Co.—8-page illustrated catalog No. 550 gives full data on "Dings-Crockett" magnet separators for concentrating magnetite and for cleaning ferrous media in sink-and-float plants. Capacities, operation, application and dimensions are given.

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and the wire-rope slings are inspected at frequent intervals for damage. Wire-rope slings are discarded as soon as breaks appear in the crown wires, and manila-rope slings are taken permanently out of service as soon as a reduction in strength is revealed by a broken strand or other damage.

New Orleans Hub Of Industrial South

(*Concluded from Page* 92)

ous other additions have been required. A new mezzanine floor has been installed, entirely of wood construction, as well as a balcony running two-thirds the length of the main assembly building. In addition, a new monorail conveyer system has been installed along one side of the building.

Key personnel from Consolidated plants in San Diego have been transferred to New Orleans to supervise the project and to recruit a working force.

Little else can be added concerning this operation, except to note that when it does get rolling it should prove spectacular, and the plant can take its place alongside the best of the East or West Coast as an airplane producing facility. As of June 1 the organization of the key personnel was 95 per cent complete. The buildings are 90 per cent complete, and the plant is in 25 per cent production.

One hesitates to make any prediction concerning its postwar possibilities. Location, layout, size and type of production are the imponderables which will have to be left to the Manufacturers' Committee of the New Orleans Association of Commerce.

Rolling west out of New Orleans, the Southern Pacific's *Sunset Limited* no longer must be laboriously ferried across the Mississippi in sections, but instead highballs across the $13,000,000 Huey P. Long Memorial bridge, a railroad-highway engineering landmark stretching 4½ miles from one approach to the other and clearing the channel at a height of 135 feet on piers set 750 feet apart.

500-Ton Blast Furnace Completed in Mexico

Compania Fundidora de Fierro y Acero de Monterrey, Mexico City, Mex., last week announced completion of a $2,000,000 blast furnace with a daily pig iron production capacity of 500 tons.

The new furnace is believed to be the largest in Latin America, company officials declare. Financed by Mexican capital, the furnace was made possible through priorities extended by the United States. Mercado Mountain in Durango state is the main source of ore supply for the new furnace.

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They had a job of pointing heavy-walled copper tubing, and wanted to speed up the operation. Just how to do it didn't appear on the horizon, and so Lewin-Mathes did the safe and logical thing—they put their swaging job up to Etna.

The answer to that problem is illustrated on this page. It's a modern Etna Swaging Machine that points *more* copper tubes per hour in less time at less cost. If you have a problem involving tapering or reducing tubing and solid rounds—ask Etna about it.

Etna has the swaging machines from ⅜" to 4" and the experience to help you get the most out of this type of machine.

IF IT'S A QUESTION OF TAPERING, SIZING OR REDUCING OF ROUND SOLIDS OR TUBING... "Ask ETNA About Swaging"

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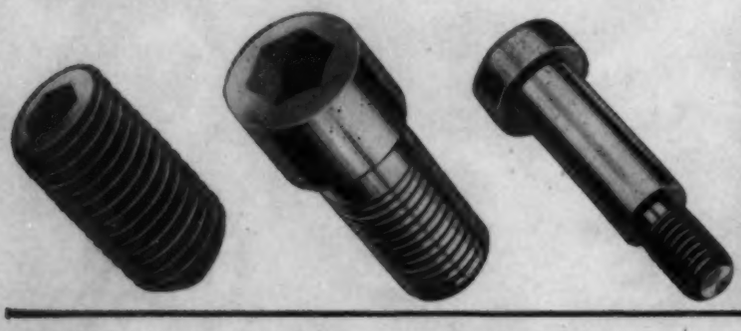

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SOCKET SCREWS

Crowded Mill Schedules May Require Revision

Late bookings may be advanced to meet urgent needs. . . . Orders now cover most of four months. . . Iron ore still far behind last year. . . Scrap holds scarcity threat

DEMAND

Heavy, bookings cover months.

PRODUCTION

Up 5 points to 97 per cent.

PRICES

Fluorspar ceiling raised.

MILL schedules are becoming so extended in some products that revisions probably will be necessary, to meet most essential needs for the war program.

Cutbacks during recent weeks have made the trade particularly alert to this possibility. The recent wave of cancellations has subsided but it is appreciated that revisions will be dictated by changes in strategy and the more advanced schedules become the more disruption will follow. It seems certain that during the time covered by long schedules important needs will appear which can be handled only by directives or some other means of revising sequence of orders.

Additionally, some claimant agencies have lagged in getting allotment numbers and inasmuch as contracts are entered in the order of their receipt some tonnage gets on books that is not as important as later bookings. The Navy is said to have been slow in placing its requirements for fourth quarter, though it is understood they are smaller than originally estimated. Its plate needs will be about 30 per cent less, it is believed, due to its strong inventory position. Maritime Commission requirements are heavier than originally outlined, for fourth quarter and also for the present quarter. This is believed to be a strong factor in the War Production Board's drive for more steel.

• • •

Plate mills are booked almost solidly through October, with many orders running well beyond. Bar mills have full schedules for almost four months and in heavy rounds and flats there are large accumulations far beyond that. Sheets are becoming increasingly scarce, with little hot or cold-rolled tonnage available before November and some sellers have little for that month. Wire shipments extend late in the year. Some structural shapes can be taken for late August delivery and some pipe, notably buttweld, is equally available.

Ingot production for first half at 43,866,912 net tons, set a new record in spite of recent interruptions because of the coal stoppage. However, June production, 7,027,101 tons, showed the effect, being the lowest monthly output since last June, with the exception of February.

Steel plate production in June was 1,056,085 net tons, compared with 1,114,920 tons in May. The record figure was set in March with 1,167,679 tons.

Steelworks production rose 5 points to 97 per cent of capacity last week, almost wiping out the decline of the previous week. Pittsburgh rebounded to 97 per cent, Wheeling rose 1 point to 87 per cent, Cleveland 2½ points to 92½ and New England 2 points to 95. Cincinnati lost 3 points to 89 per cent and Buffalo 2½ points to 90. Rates were unchanged at Chicago, 98½; Birmingham 95; St. Louis, 95; Youngstown, 94; Detroit, 92; eastern Pennsylvania 93.

From practically all sections of the country come reports of declining activity of gray iron foundries as demand for castings falls off. In numerous instances foundries are closing for vacations and inventory, to a much greater degree than last year. Effect of this condition has been reflected in allotments of pig iron for July delivery. A further result of this slackening in castings production is a marked reduction in demand for heavy breakable and other cast scrap grades, which are almost a drug on the market in some areas. Some foundries have much larger scrap inventory than current demand would dictate.

• • •

Scrap supply is sufficient for current needs, industrial grades and heavy melting steel coming out in good volume. Yards are accumulating considerable tonnage which is not being handled promptly, in view of labor shortage. Melters in most cases are not accumulating normal reserves. Many observers fear a tight situation by fall.

In an effort to stimulate production of fluorspar, Office of Price Administration has raised the ceiling $5 per ton on all grades, the new range being $30 to $33 per ton, instead of $25 to $28. Of the $5 increase $3.50 is to compensate for higher wages and the remaining $1.50 is to encourage development of new fields.

Iron ore shipments from Lake Superior mines continue to lag and the deficit from 1942 tonnage was greater at the end of June than at the close of May. June shipments totaled 11,864,401 gross tons, which was 760,701 tons less than in May, a loss of 6.03 per cent. For the season to July 1 the decrease from 1942 to the same date was 9,158,276 tons, 26.97 per cent, compared with a shortage of 8,397,575 tons June 1.

Average composite prices of steel and iron products are steady at levels of the past several months. Finished steel composite is $56.73, semifinished steel at $36, steelmaking pig iron $23.05 and steelmaking scrap $19.17.

COMPOSITE MARKET AVERAGES

	July 10	July 3	June 26	One Month Ago June 1943	Three Months Ago April, 1943	One Year Ago July, 1942	Five Year Ago July, 1938
Finished Steel	$56.73	$56.73	$56.73	$56.73	$56.73	$56.73	$58.00
Semifinished Steel	36.00	36.00	36.00	36.00	36.00	36.00	36.60
Steelmaking Pig Iron	23.05	23.05	23.05	23.05	23.05	23.05	19.05
Steelmaking Scrap	19.17	19.17	19.17	19.17	19.17	19.17	13.30

Finished Steel Composite:—Average of industry-wide prices on sheets, strip, bars, plates, shapes, wire, nails, tin plate, standard and line pipe. Semifinished Steel Composite:—Average of industry-wide prices on billets, slabs, sheet bars, skelp and wire rods. Steelmaking Pig Iron Composite:—Average of basic pig iron prices at Bethlehem, Birmingham, Buffalo, Chicago, Cleveland, Neville Island, Granite City and Youngstown. Steelworks Scrap Composite:—Average of No. 1 heavy melting steel prices at Pittsburgh, Chicago and eastern Pennsylvania.

COMPARISON OF PRICES

Representative Market Figures for Current Week; Average for Last Month, Three Months and One Year Ago

Finished Material	July 10, 1943	June, 1943	April, 1943	July, 1942
Steel bars, Pittsburgh	2.15c	2.15c	2.15c	2.15c
Steel bars, Chicago	2.15	2.15	2.15	2.15
Steel bars, Philadelphia	2.47	2.49	2.49	2.49
Shapes, Pittsburgh	2.10	2.10	2.10	2.10
Shapes, Philadelphia	2.215	2.22	2.22	2.22
Shapes, Chicago	2.10	2.10	2.10	2.10
Plates, Pittsburgh	2.10	2.10	2.10	2.10
Plates, Philadelphia	2.15	2.15	2.15	2.15
Plates, Chicago	2.10	2.10	2.10	2.10
Sheets, hot-rolled, Pittsburgh	2.10	2.10	2.10	2.10
Sheets, cold-rolled, Pittsburgh	3.05	3.05	3.05	3.05
Sheets, No. 24 galv., Pittsburgh	3.50	3.50	3.50	3.50
Sheets, hot-rolled, Gary	2.10	2.10	2.10	2.10
Sheets, cold-rolled, Gary	3.05	3.05	3.05	3.05
Sheets, No. 24 galv., Gary	3.50	3.50	3.50	3.50
Bright bess., basic wire, Pittsburgh	2.60	2.60	2.60	2.60
Tin plate, per base box, Pittsburgh	$5.00	$5.00	$5.00	$5.00
Wire nails, Pittsburgh	2.55	2.55	2.55	2.55
Semifinished Material				
Sheet bars, Pittsburgh, Chicago	$34.00	$34.00	$34.00	$34.00
Slabs, Pittsburgh, Chicago	34.00	34.00	34.00	34.00
Rerolling billets, Pittsburgh	34.00	34.00	34.00	34.00
Wire rods, No. 5 to ⅜-inch, Pitts.	2.00	2.00	2.00	2.00

Pig Iron	July 10, 1943	June, 1943	April, 1943	July, 1942
Bessemer, del. Pittsburgh	$25.19	$25.19	$25.19	$25.19
Basic, Valley	23.50	23.50	23.50	23.50
Basic, eastern, del. Philadelphia	25.34	25.39	25.39	25.39
No. 2 fdry., del. Pitts., N.&S. Sides	24.69	24.69	24.69	24.69
No. 2 foundry, Chicago	24.00	24.00	24.00	24.00
Southern No. 2, Birmingham	20.38	20.38	20.38	20.38
Southern No. 2, del. Cincinnati	24.30	24.30	24.30	24.06
No. 2 fdry., del. Phila.	25.84	25.89	25.89	25.89
Malleable, Valley	24.00	24.00	24.00	24.00
Malleable, Chicago	24.00	24.00	24.00	24.00
Lake Sup., charcoal, del. Chicago	31.34	31.54	31.54	31.54
Gray forge, del. Pittsburgh	24.19	24.19	24.19	24.19
Ferromanganese, del. Pittsburgh	140.33	140.65	140.65	140.65
Scrap				
Heavy melting steel, Pittsburgh	$20.00	$20.00	$20.00	$20.00
Heavy melt. steel, No. 2, E. Pa.	18.75	18.75	18.75	18.75
Heavy melting, steel, Chicago	18.75	18.75	18.75	18.75
Rails for rolling, Chicago	22.25	22.25	22.25	22.25
No. 1 cast, Chicago	20.00	20.00	20.00	20.00
Coke				
Connellsville, furnace, ovens	$6.50	$6.50	$6.40	$6.00
Connellsville, foundry, ovens	7.75	7.75	7.50	7.25
Chicago, by-product fdry., del.	12.25	12.25	12.25	12.25

STEEL, IRON, RAW MATERIAL, FUEL AND METALS PRICES

Following are maximum prices established by OPA Schedule No. 6 issued April 16, 1941, revised June 20, 1941 and Feb. 4, 1942. The schedule covers all iron or steel ingots, all semifinished iron or steel products, all finished hot-rolled, cold rolled iron or steel products and any iron or steel product which is further finished by galvanizing, plating, coating, drawing, extruding, etc., although only principal established basing points for selected products are named specifically. All seconds and off-grade products also are covered. Exceptions applying to individual companies are noted in the table. Federal tax on freight charges, effective Dec. 1, 1942, not included in following prices.

Semifinished Steel

Gross ton basis except wire rods, skelp.

Carbon Steel Ingots: F.o.b. mill base, rerolling qual., stand. analysis, $31.00.
(Empire Sheet & Tin Plate Co., Mansfield, O., may quote carbon steel ingots at $33 gross ton, f.o.b. mill.)

Alloy Steel Ingots: Pittsburgh, Chicago, Buffalo, Bethlehem, Canton, Massillon; uncropped, $45.

Rerolling Billets, Blooms, Slabs: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, Sparrows Point, Birmingham, Youngstown, $34.00; Detroit, del. $36; Duluth (bil.) $36.
(Andrews Steel Co., carbon slabs $41; Continental Steel Corp., billets $34, Kokomo, to Acme Steel Co.; Northwestern Steel & Wire Co. $41, Sterling, Ill.; Laclede Steel Co. $34, Alton or Madison, Ill.; Wheeling Steel Corp. $36 base, billets for lend-lease, $34, Portsmouth, O., on slabs on WPB directives.)

Forging Quality Blooms, Slabs, Billets: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, Birmingham, Youngstown, $40. Detroit, del. $42; Duluth, $42.
(Andrews Steel Co. may quote carbon forging billets $50 gross ton and Follansbee Steel Corp. $49.50 at established basing points.)

Open Hearth Shell Steel: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, Youngstown, Birmingham, base 1000 tons one size and section: 3-12 in., $52; 12-18 in., excl., $54.00; 18 in. and over, $56. Add $1.75 del. Detroit; $2.75 del. Eastern Mich.

Alloy Billets, Slabs, Blooms: Pittsburgh, Chicago, Buffalo, Bethlehem, Canton, Massillon, $54; del. Detroit $56, Eastern Mich. $57.

Sheet Bars: Pittsburgh, Chicago, Cleveland, Buffalo, Canton, Sparrows Point, Youngstown, $34. (Wheeling Steel Corp. $37 on lend-lease sheet bars, $38 Portsmouth, O., on WPB directives; Empire Sheet & Tin Plate Co., Mansfield, O., carbon sheet bars, $39, f.o.b. mill.)

Skelp: Pittsburgh, Chicago, Sparrows Pt., Youngstown, Coatesville, lb., 1.90c.

Wire Rods: Pittsburgh, Chicago, Cleveland, Birmingham, Galveston, No. 5—9/32 in., inclusive, per 100 lbs., $2. Do., over 9/32—47/64-in., incl., $2.15.
Worcester add $0.10; Pacific Ports $0.50.

Bars

Hot-Rolled Carbon Bars and Bar-Size Shapes under 3": Pittsburgh, Chicago, Gary, Cleveland, Buffalo, Birmingham, base 20 tons one size, 2.15c; Duluth, base 2.25c; Mahoning Valley 2.22½c; Detroit, del. 2.25c; Eastern Mich. 2.30c; New York del. 2.49c; Phila. del. 2.47c; Gulf Ports, dock 2.52c; Pac. ports, dock 2.80c. (Phoenix Iron Co., Phoenixville, Pa., may quote 2.35c and Eckels Mfg. Co. 2.40c at established basing points. Joslyn Mfg. Co. may quote 2.35c, Chicago base. Calumet Steel Division, Borg Warner Corp., may quote 2.35c, Chicago base, on bars produced in its 8-inch mill.)

Rail Steel Bars: Same prices as for hot-rolled carbon bars except base is 5 tons.
(Sweet's Steel Co., Williamsport, Pa., may quote rail steel merchant bars 2.33c f.o.b. mill.)

Hot-Rolled Alloy Bars: Pittsburgh, Chicago, Canton, Massillon, Buffalo, Bethlehem, base 20 tons one size, 2.70c; Detroit, del., 2.82c.
(Texas Steel Co. may use Chicago base price as maximum f.o.b. Fort Worth, Tex., price on sales outside Texas, Oklahoma.)

AISI Series	(*Basic O-H)	AISI Series	(*Basic O-H)
1300	$0.10	4100 (.15-.25 Mo)	0.55
		(.20-.30 Mo)	0.60
2300	1.70	4340	1.70
2500	2.55	4600	1.20
3000	0.50	4800	2.15
3100	0.70	5100	0.35
3200	1.35	5130 or 5152	0.45
3400	3.20	6120 or 6152	0.95
4000	0.45-0.55	6145 or 6150	1.20

*Add 0.25 for acid open-hearth; 0.50 electric.

Cold-Finished Carbon Bars: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, base 20,000-39,999 lbs., 2.65c; Detroit 2.70c; Toledo 2.80c. (Keystone Drawn Steel Co. may sell outside its usual market area on Proc. Div., Treasury Dept. contracts at 2.65c, Spring City, Pa., plus freight on hot-rolled bars from Pittsburgh to Spring City. New England Drawn Steel Co. may sell outside New England on WPB directives at 2.65c, Mansfield, Mass., plus freight on hot-rolled bars from Buffalo to Mansfield.)

Cold-Finished Alloy Bars: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, base 3.35c; Detroit, del. 3.45c; Eastern Mich 3.50c.

Reinforcing Bars (New Billet): Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Sparrows Point, Buffalo, Youngstown, base 2.15c; Detroit del. 2.25c; Eastern Mich. and Toledo 2.30c; Gulf ports, dock 2.50c; Pacific ports, dock 2.55c.

Reinforcing Bars (Rail Steel): Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Youngstown base 2.15c; Detroit, del. 2.25c; Eastern Mich. and Toledo 2.30c; Gulf ports, dock 2.50c; Pacific ports, dock 2.80c.
(Sweet's Steel Co., Williamsport, Pa., may quote rail steel reinforcing bars 2.33c, f.o.b. mill.)

Iron Bars: Single refined, Pitts. 4.40c, double refined 5.40c; Pittsburgh, staybolt, 5.75c; Terre Haute, common, 2.15c.

Sheets, Strip

Hot-Rolled Sheets: Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Buffalo, Youngstown, Sparrows Pt., Middletown, base 2.10c; Granite City, base 2.20c; Detroit del. 2.20c; Eastern Mich. 2.25c; Phila. del. 2.27c; New York del., 2.34c; Pacific ports 2.65c.
(Andrews Steel Co. may quote hot-rolled sheets for shipment to Detroit and the Detroit area on the Middletown, O. base.)

Cold-Rolled Sheets: Pittsburgh, Chicago, Cleveland, Gary, Buffalo, Youngstown, Middletown, base, 3.05c; Granite City, base 3.15c; Detroit del. 3.15c; Eastern Mich. 3.20c; New York del. 3.39c; Phila. del. 3.37c; Pacific ports 3.70c.

Galvanized Sheets, No. 24: Pittsburgh, Chicago, Gary, Birmingham, Buffalo, Youngstown, Sparrows Point, Middletown, base 3.50c; Granite City, base 3.60c; New York del. 3.74c; Phila. del. 3.67c; Pacific ports 4.05c.
(Andrews Steel Co. may quote galvanized sheets 3.75c at established basing points.)

Corrugated Galv. Sheets: Pittsburgh, Chicago, Gary, Birmingham, 29 gage, per square 3.31c.

Culvert Sheets: Pittsburgh, Chicago, Gary, Birmingham, 16 gage, not corrugated, copper alloy 3.60c; Granite City 3.70c; Pacific Ports 4.25c; copper iron 3.90c, pure iron 3.95c; zinc-coated, hot-dipped, heat-treated, No. 24, Pittsburgh 4.25c.

Enameling Sheets; Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Middletown, 10 gage, base 2.75c; Granite City, base 2.85c; Detroit del. 2.85c; Eastern Mich. 2.90c; Pacific ports 3.40c.

Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Middletown, 20 gage, base 3.35c; Granite City, base 3.45c; Detroit del. 3.45c; Eastern Mich. 3.50c; Pacific ports 4.00c.

Electrical Sheets, No. 24:

	Pittsburgh Base	Pacific Ports	Granite City
Field grade	3.20c	3.95c	3.30c
Armature	3.55c	4.30c	3.65c
Electrical	4.05c	4.80c	4.15c
Motor	4.95c	5.70c	5.05c
Dynamo	5.65c	6.40c	5.75c
Transformer			
72	6.15c	6.90c	....
65	7.15c	7.90c	....
58	7.65c	8.40c	....
52	8.45c	9.20c	....
U.S.S., R.C. Grade 10.10	....	....	....

Hot-Rolled Strip: Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Youngstown, Middletown, base, 1 ton and over, 12 inches wide and less 2.10c;.. Detroit del. 2.20c; Eastern Mich. 2.25c; Pacific ports 2.75c. (Joslyn Mfg.

Cold Rolled Strip: Pittsburgh, Cleveland, Youngstown, 0.25 carbon and less 2.80c; Chicago, base 2.90c; Detroit, del. 2.90c; Eastern Mich. 2.95c; Worcester base 3.00c

Commodity C. R. Strip: Pittsburgh, Cleveland, Youngstown, base 3 tons and over, 2.95c; Chicago 3.05c; Detroit del. 3.45c; Eastern Mich. 3.50c; Worcester base 3.35c.

Cold-Finished Spring Steel: Pittsburgh, Cleveland bases, add 20c for Worcester; .26-.50 Carb., 2.80c; .51-.75 Carb., 4.30c; .76-1.00 Carb., 6.15c; over 1.00 Carb., 8.35c.

Tin, Terne Plate

Tin Plate: Pittsburgh, Chicago, Gary, 100-lb. base box, $5.00; Granite City $5.10.

Electrolytic Tin Plate: Pittsburgh, Gary, 100-lb. base box, 0.50 lb. tin, $4.50; 0.75 lb. tin $4.65.

Tin Mill Black Plate, Pittsburgh, Chicago, Gary, base 29 gage and lighter, 3.05c; Granite City, 3.15c; Pacific ports, boxed 4.05c.

Long Ternes: Pittsburgh, Chicago, Gary, No. 24 unassorted 3.80c; Pacific ports 4.55c.

Manufacturing Ternes: (Special Coated) Pittsburgh, Chicago, Gary, 100-base box $4.30; Granite City $4.40.

Roofing Ternes: Pittsburgh base per package 112 sheets; 20 x 28 in., coating I.C., 8-lb. $12.00; 15-lb. $14.00; 20-lb. $15.00; 25-lb. $16.00; 30-lb. $17.25; 40-lb. $19.50.

Plates

Carbon Steel Plates: Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Youngstown, Sparrows Point, Coatesville, Claymont, 2.10c; New York, del., 2.29c; Phila., del., 2.15c; St. Louis, 2.34c; Boston, del., 2.42-67c; Pacific ports, 2.65c; Gulf Ports, 2.45c.

(Granite City Steel Co. may quote carbon plates 2.35c, f.o.b. mill. Central Iron & Steel Co. 2.20c, f.o.b. basing points.)

Floor Plates: Pittsburgh, Chicago, 3.35c; Gulf ports, 3.72c; Pacific ports, 4.00c.

Open-Hearth Alloy Plates: Pittsburgh, Chicago, Coatesville, 3.50c; Gulf ports 3.95c; Pacific ports 4.15c.

Wrought Iron Plates: Pittsburgh, 3.80c

Shapes

Structural shapes: Pittsburgh, Chicago, Gary, Birmingham, Buffalo, Bethlehem, 2.10c; New York, del., 2.27c; Phila., del., 2.215c; Gulf ports, 2.47c; Pacific ports, 2.75c.

(Phoenix Iron Co., Phoenixville, Pa. may quote carbon steel shapes at 2.30c at established basing points and 2.50c, Phoenixville, for export.)

Steel Sheet Piling: Pittsburgh, Chicago, Buffalo, 2.40c.

Wire Products, Nails

Wire: Pittsburgh, Chicago, Cleveland, Birmingham (except spring wire) to manufacturers in carloads (add $2 for Worcester, $1 for Duluth):

Bright basic, bessemer wire	2.60c
Galvanized wire	2.60c
Spring wire	3.20c

Wire Products to the Trade:

Standard and Cement-coated wire nails, and staples, 100-lb. keg, Pittsburgh, Chicago, Birmingham, Cleveland, Duluth $2.55; Pacific ports	3.05c
Annealed fence wire, 100-lb., Pittsburgh, Chicago, Cleveland	3.05c
Galvanized fence wire, 100 lb., Pittsburgh, Chicago, Cleveland	3.40c
Woven fence, 15½ gage and heavier, per base column	.67

Barbed wire, 80-rod spool, Pittsburgh, Chicago, Cleveland, Birmingham, column 70; twisted barbless wire, column 70; single loop bale ties, column 59; fence posts, carloads, column 69.

Pipe, Tubes

Welded Pipe: Base price in carloads, threaded and coupled, to consumers about $200 per net ton. Base discounts on steel pipe Pittsburgh and Lorain, O.; Gary, Ind. 2 points less on lap weld, 1 point less on butt weld. Pittsburgh base only on wrought iron pipe.

Butt Weld

In.	Steel Blk.	Steel Galv.	In.	Iron Blk.	Iron Galv.
⅛	56	33	¼	24	3½
¼ & ⅜	59	40½	⅜	30	10
½	63½	51	½-1¼	34	16
¾	66½	55	1½	38	18½
1-3	68½	57½	2	37½	18

Lap Weld

In.	Steel Blk.	Steel Galv.	In.	Iron Blk.	Iron Galv.
2	61	49½	1¼	23	3½
2½-3	64	52½	1½	28½	10
3½-6	66	54½	2	30½	12
7-8	65	52½	2½, 3½	31½	14½
9-10	64½	52	4	33½	18
11-12	63½	51	4½-8	32½	17
			9-12	28½	12

Boiler Tubes: Net base prices per 100 feet, f.o.b. Pittsburgh in carload lots, minimum wall, cut lengths 4 to 24 feet, inclusive.

O. D. Sizes	B.W.G.	—Seamless— Hot Rolled	Cold Drawn	—Lap Weld— Steel	Charcoal Iron
1"	13	$ 7.82	$ 9.01	....	....
1¼"	13	9.26	10.67	....	....
1½"	13	10.23	11.72	$ 9.72	$23.71
1¾"	13	11.64	13.42	11.06	22.93
2"	13	13.04	15.03	12.38	19.35
2¼"	13	14.54	16.76	13.79	21.63
2½"	12	16.01	18.45	15.16	....
2½"	12	17.54	20.21	16.58	26.57
2¾"	12	18.59	21.42	17.54	29.00
3"	12	19.50	22.48	18.35	31.38
3½"	11	24.63	28.37	23.15	39.81
4"	10	30.54	35.20	28.66	49.90
4½"	10	37.35	43.04	35.22	....
5"	9	46.87	54.01	44.25	73.93
6"	7	71.96	82.93	68.14	....

Rails, Supplies

Standard rails, over 60-lb., f.o.b. mill, gross ton, $40.00.

Light rails (billet), Pittsburgh, Chicago, Birmingham, gross ton, $40.00.

*Relaying rails, 35 lbs. and over, f.o.b. railroad and basing points, $28-$30.

Supplies: Angle bars, 2.70c; track spikes, 3.00c; track bolts, 4.75c; do. heat treated, 5.00c. Tie plates, $43 gross ton, base.

*Fixed by OPA Schedule No. 46, Dec. 15, 1941.

Tool Steels

Tool Steels: Pittsburgh, Bethlehem, Syracuse, base, cents per lb.: Reg. carbon 14.00c; extra carbon 18.00c; special carbon 22.00c; oil-hardening 24.00c; high car.-chr. 43.00c.

High Speed Tool Steels:

Tung.	Chr.	Van.	Moly.	Pitts. base. per lb.
18.00	4	1	...	67.00c
1.5	4	1	8.5	54.00c
	4	2	8	54.00c
5.50	4	1.50	4	57.50c
5.50	4.50	4	4.50	70.00c

Stainless Steels

Base, Cents per lb.—f.o.b. Pittsburgh

Type	Bars	Plates	Sheets	H. R. Strip	C. R. Strip
CHROMIUM NICKEL STEEL					
302	24.00c	27.00c	34.00c	21.50c	28.00c
303	26.00	29.00	36.00	27.00	33.00
304	25.00	29.00	36.00	23.50	30.00
308	29.00	34.00	41.00	28.50	35.00
309	36.00	40.00	47.00	37.00	47.00
310	49.00	52.00	53.00	48.75	56.00
312	36.00	40.00	49.00	....	....
*316	40.00	44.00	48.00	40.00	48.00
†321	29.00	34.00	41.00	29.25	38.00
‡347	33.00	38.00	45.00	33.00	42.00
431	19.00	22.00	29.00	17.50	22.50
STRAIGHT CHROMIUM STEEL					
403	21.50	24.50	29.50	21.25	27.00
**410	18.50	21.50	26.50	17.00	22.00
416	19.00	22.00	27.00	18.25	23.50
††420	24.00	28.50	33.50	23.75	36.50
430	19.00	22.00	29.00	17.50	22.50
‡‡430F.	19.50	22.50	29.50	18.75	24.50
440A	24.00	28.50	33.50	23.75	36.50
442	22.50	25.50	32.50	24.00	32.00
443	22.50	25.50	32.50	24.00	32.00
446	27.50	30.50	36.50	35.00	52.00
501	8.00	12.00	15.75	12.00	17.00
502	9.00	13.00	16.75	13.00	18.00
STAINLESS CLAD STEEL (20%)					
304	....	§§18.00	19.00	....	....

*With 2-3% moly. †With titanium. ‡With columbium. ** Plus machining agent. ††High carbon. ‡‡Free machining. §§Includes annealing and pickling.

Basing Point Prices are (1) those announced by U. S. Steel Corp. subsidiaries for first quarter of 1941 or in effect April 16, 1941 at designated basing points or (2) those prices announced or customarily quoted by other producers at the same designated points. Base prices under (2) cannot exceed those under (1) except to the extent prevailing in third quarter of 1940.

Extras mean additions or deductions from base prices in effect April 16, 1941.

Delivered prices applying to Detroit, Eastern Michigan, Gulf and Pacific Coast points are deemed basing points except in the case of the latter two areas when water transportation is not available, in which case nearest basing point price, plus all-rail freight may be charged.

Domestic Ceiling prices are the aggregate of (1) governing basing point price, (2) extras and (3) transportation charges to the point of delivery as customarily computed. **Governing basing point** is basing point nearest the consumer providing the lowest delivered price. **Emergency basing point** is the basing point at or near the place of production or origin.

Seconds, maximum prices: flat-rolled rejects 75% of prime prices; wasters 75%, waste-wasters 65%, except plates, which take waster prices; tin plate $2.80 per 100 lbs.; terne plate $2.25; semifinished 85% of primes; other grades limited to new material ceilings.

Export ceiling prices may be either the aggregate of (1) governing basing point or emergency basing point (2) export extras (3) export transportation charges provided they are the f.a.s. seaboard quotations of the U. S. Steel Export Co. on April 16, 1941.

Bolts, Nuts

F.o.b. Pittsburgh, Cleveland, Birmingham, Chicago. Discounts for carloads additional 5%, full containers, add 10%.

Carriage and Machine

⅛ x 6 and smaller	65½ off
Do., ¼ and ⅜ x 6-in. and shorter	63½ off
Do., ½ to 1 x 6-in. and shorter	61 off
1⅛ and larger, all lengths	59 off
All diameters, over 6-in. long	59 off
Tire bolts	50 off
Step bolts	56 off
Plow bolts	65 off

Stove Bolts

In packages with nuts separate 71-10 off; with nuts attached 71 off; bulk 80 off on 15,000 of 3-inch and shorter, or 5000 over 3-in.

Nuts

	U.S.S.	S.A.E.
Semifinished hex.	62	64
⅞-inch and less	59	60
1-1½-inch	57	58
1¾ and larger	56	..

Hexagon Cap Screws

Upset 1-in., smaller	64 off
Milled 1-in., smaller	60 off

Square Head Set Screws

Upset, 1-in., smaller	71 off
Headless, ⅛-in., larger	60 off
No. 10, smaller	70 off

Piling

Pittsburgh, Chicago, Buffalo 2.40c

Rivets, Washers

F.o.b. Pittsburgh, Cleveland, Chicago, Birmingham

Structural	3.75c
⅞-inch and under	65-5 off
Wrought washers, Pittsburgh, Chicago, Philadelphia, to jobbers and large nut, bolt manufacturers l.c.l.	$2.75-3.00 off

Metallurgical Coke

Price Per Net Ton

Beehive Ovens

Connellsville, furnace	*6.50
Connellsville, foundry	7.50- 8.00
Connellsville prem. fdry.	7.75- 8.10
New River, foundry	8.50- 8.75
Wise county, foundry	7.25- 7.75
Wise county, furnace	6.75- 7.25

By-Product Foundry

Kearny, N. J., ovens	12.15
Chicago, outside delivered	11.50
Chicago, delivered	12.25
Terre Haute, delivered	12.00
Milwaukee, ovens	12.25
New England, delivered	13.75
St. Louis, delivered	†12.25
Birmingham, ovens	8.50
Indianapolis, delivered	12.00
Cincinnati, delivered	11.75
Cleveland, delivered	12.30
Buffalo, delivered	12.50
Detroit, delivered	12.25
Philadelphia, delivered	12.38

*Operators of hand-drawn ovens using trucked coal may charge $7.00, effective Feb. 3, 1943.
†$12.75 from other than Ala., Mo., Tenn.

Coke By-Products

Spot, gal., freight allowed east of Omaha

Pure and 90% benzol	15.00c
Toluol, two degree	28.00c
Solvent naphtha	27.00c
Industrial xylol	27.00c
Per lb. f.o.b. works	
Phenol (car lots, returnable drums)	12.50c
Do., less than car lots	13.25c
Do. tank cars	11.50c
Eastern Plants, per lb.	
Naphthalene flakes, balls, bbls., to jobbers	8.00c
Per ton, bulk, f.o.b. port	
Sulphate of ammonia	$29.20

Pig Iron

Prices (in gross tons) are maximums fixed by OPA Price Schedule No. 10, effective June 10, 1941. Exceptions indicated in footnotes. Allocation regulations from WPB Order M-17, expiring Dec. 31, 1942. Base prices bold face, delivered light face. Federal tax on freight charges, effective Dec. 1, 1942, not included in following prices.

	No. 2 Foundry	Basic*	Bessemer	Malleable
Bethlehem, Pa., base	$25.00	$24.50	$26.00	$25.50
Newark, N. J., del.	26.53	26.03	27.53	27.03
Brooklyn, N. Y., del.	27.50	.....	.....	28.00
Birdsboro, Pa., base	25.00	24.50	26.00	25.50
Birmingham, base	‡20.38	†19.00	.....	.....
Baltimore, del.	25.61	.....	.....	.....
Boston, del.	25.12	.....	.....	.....
Chicago, del.	24.22	.....	.....	.....
Cincinnati, del.	24.06	22.60	.....	.....
Cleveland, del.	24.12	23.24	.....	.....
Newark, N. J., del.	26.15	.....	.....	.....
Philadelphia, del.	25.46	24.58	.....	.....
St. Louis, del.	24.12	23.24	.....	.....
Buffalo, base	24.00	23.00	25.00	24.50
Boston, del.	25.50	25.00	26.50	26.00
Rochester, del.	25.53	.....	26.53	26.03
Syracuse, del.	26.08	.....	27.08	26.58
Chicago, base	24.00	23.50	24.50	24.00
Milwaukee, del.	25.10	24.60	25.60	25.10
Muskegon, Mich., del.	27.19	.....	.....	27.19
Cleveland, base	24.00	23.50	24.50	24.00
Akron, Canton, O., del.	25.39	24.89	25.89	25.39
Detroit, base	24.00	23.50	24.50	24.00
Saginaw, Mich., del.	26.31	25.81	26.81	26.31
Duluth, base	24.50	24.00	25.00	24.50
St. Paul, del.	26.63	26.13	27.13	26.63
Erie, Pa., base	24.00	23.50	25.00	24.50
Everett, Mass., base	25.00	24.50	26.00	25.50
Boston, del.	25.50	25.00	26.50	26.00
Granite City, Ill., base	24.00	23.50	24.50	24.00
St. Louis, del.	24.50	24.00	.....	24.50
Hamilton, O., base	24.00	23.50	.....	24.00
Cincinnati, del.	24.44	24.61	.....	25.11
Neville Island, Pa., base	24.00	23.50	24.50	24.00
‖Pittsburgh, del. No. & So. sides	24.69	24.19	25.19	24.69
Provo, Utah, base	22.00	21.50	.....	.....
Sharpsville, Pa., base	24.00	23.50	24.50	24.00
Sparrows Point, Md., base	25.00	24.50	.....	.....
Baltimore, del.	25.99	.....	.....	.....
Steelton, Pa., base	.....	24.50	.....	25.50
Swedeland, Pa., base	25.00	24.50	26.00	25.50
Philadelphia, del.	25.84	25.34	.....	26.34
Toledo, O., base	24.00	23.50	24.50	24.00
Mansfield, O., del.	25.94	25.44	25.44	25.94
Youngstown, O., base	24.00	23.50	24.50	24.00

*Basic silicon grade (1.75-2.25%), add 50c for each 0.25%. †For phosphorus 0.70 and over deduct 38c. ‡Over 0.70 phos. ‖For McKees Rocks, Pa., add .85 to Neville Island base; Lawrenceville, Homestead, McKeesport, Ambridge, Monaca, Aliquippa, .84; Monessen, Monongahela City .97 (water); Oakmont, Verona 1.11; Brackenridge 1.24.

Note: Add 50 cents per ton for each 0.50% manganese over 1.00%.

High Silicon, Silvery

6.00-6.50 per cent (base)	$29.50		
6.51-7.00	$30.50	9.01- 9.50	$35.50
7.01-7.50	31.50	9.51-10.00	36.50
7.51-8.00	32.50	10.01-10.50	37.50
8.01-8.50	33.50	10.51-11.00	38.50
8.51-9.00	34.50	11.01-11.50	39.50

F.o.b. Jackson county, O., per gross ton, Buffalo base prices are $1.25 higher. Prices subject to additional charge of 50 cents a ton for each 0.50% manganese in excess of 1.00%.

Bessemer Ferrosilicon

Prices same as for high silicon silvery iron, plus $1 per gross ton.

Charcoal Pig Iron

Northern

Lake Superior Furn.	$28.00
Chicago, del.	31.34

(For higher silicon irons a differential over and above the price of base grades is charged as well as for the hard chilling iron, Nos. 5 and 6.)

Southern

Semi-cold blast, high phos., f.o.b. furnace, Lyles, Tenn.	$28.50
Semi-cold blast, low phos., f.o.b. furnace, Lyles, Tenn.	33.00

Gray Forge

Neville Island, Pa.	$23.50
Valley, base	23.50

Low Phosphorus

Basing points: Birdsboro and Steelton, Pa., and Buffalo, N. Y., $29.50 base; $30.74, delivered, Philadelphia.

Switching Charges: Basing point prices are subject to an additional charge for delivery within the switching limits of the respective districts.

Silicon Differentials: Basing point prices are subject to an additional charge not to exceed 50 cents a ton for each 0.25 silicon in excess of base grade (1.75 to 2.25%).

Phosphorus Differential: Basing point prices are subject to a reduction of 38 cents a ton for phosphorus content of 0.70% and over.

Manganese Differentials: Basing point prices subject to an additional charge not to exceed 50 cents a ton for each 0.50% manganese content in excess of 1.0%.

Ceiling Prices are the aggregate of (1) governing basing point (2) differentials (3) transportation charges from governing basing point to point of delivery as customarily computed. Governing basing point is the one resulting in the lowest delivered price for the consumer.

Exceptions to Ceiling Prices: Pittsburgh Coke & Iron Co. (Sharpsville Pa. furnace only) and Struthers Iron & Steel Co. may charge 50 cents a ton in excess of basing point prices for No. 2 Foundry, Basic Bessemer and Malleable. Mystic Iron Works, Everett, Mass., may exceed basing point prices by $1 per ton, effective April 20, 1942. Chester, Pa., furnace of Pittsburgh Coke & Iron Co. may exceed basing point prices by $2.25 per ton, effective July 27, 1942.

Refractories

Per 1000 f.o.b. Works, Net Prices

Fire Clay Brick	
Super Quality	
Pa., Mo., Ky.	$64.60
First Quality	
Pa., Ill., Md., Mo., Ky.	51.30
Alabama, Georgia	51.30
New Jersey	56.00
Ohio	43.00
Second Quality	
Pa., Ill., Md., Mo., Ky.	46.55
Alabama, Georgia	38.00
New Jersey	49.00
Ohio	36.00
Malleable Bung Brick	
All bases	$59.85
Silica Brick	
Pennsylvania	$51.30
Joliet, E. Chicago	58.90
Birmingham, Ala.	51.30
Ladle Brick	
(Pa., O., W. Va., Mo.)	
Dry press	$31.00
Wire cut	29.00
Magnesite	
Domestic dead-burned grains, net ton f.o.b. Chewelah, Wash., net ton, bulk	22.00
net ton, bags	26.00
Basic Brick	
Net ton, f.o.b. Baltimore, Plymouth Meeting, Chester, Pa.	
Chrome brick	$51.00
Chem. bonded chrome	51.00
Magnesite brick	76.00
Chem. bonded magnesite	65.00

Fluorspar

Washed gravel, f.o.b. Ill., Ky., net ton, carloads, all rail	$30.00-33.00
Do., barge	30.00-33.00
No. 2 lump	30.00-33.00

(Prices effective July 1, 1943.)

Ferroalloy Prices

Ferromanganese: 78-82%, carlots, gross ton, duty paid, Atlantic ports, $135; Del. Pittsburgh $140.33; f.o.b. Southern furnaces $135; Add $6 per gross ton for packed carloads $10 for ton, $13.50 for less-ton.

Spiegeleisen: 19-21%, carlots per gross ton, Palmerton, Pa. $36; 16-19%, $35.

Electrolytic Manganese: 99.9% plus, less ton lots, per lb. 37.6 cents.

Electric Furnace Ferromanganese: 10.40c to 26.50c per lb. cont. Mn. Same zones and differentials as Silicomanganese.

Chromium Metal: Per lb contained chromium in gross ton lots, contract basis, freight allowed, 98% 80.00c, 88% 79.00c. Spot prices 5 cents per lb. higher.

Ferrocolumbium: 50-60%, per lb. contained columbium in gross ton lots, contract basis, f.o.b. Niagara Falls, N. Y. $2.25; less-ton lots $2.30. Spot prices 10 cents per lb. higher.

Ferrochromium: Carloads f.o.b. shipping point, freight allowed; eastern zone, high-carbon standard, 13-14½c per lb. Cr. cont., according to crushed size; high-carbon S. M., 14-15½c; high-carbon high-nitro, 18-19½c; high-carbon foundry, 13½-14c; low-carbon standard, 10 grades, 19½ to 54c; low-carbon S. M., 20-49c; low-carbon high-nitro, 2c over low-carbon standard; chromium metal, 78½c to 99¼c; central zone add .4c lb. for carloads, .65c for l.c.l. on ferrochromium, .15c. carloads, 2.5c l.c.l. on chromium metal; western zone add 1c for carloads, 1.85c, l.c.l. on ferrochromium, 2.75c carloads, 4.75c l.c.l. on chromium metal.

Chromium briquets: Contract basis in carloads per lb., freight allowed 8.25c; packed 8.50c; gross ton lots 8.75c; less-ton lots 9.00c; less 200-lb. lots 9.25c. Spot prices ¼-cent higher.

Ferromolybdenum: 55-75%, per lb. contained molybdenum, f.o.b. Langeloth and Washington, Pa., furnace, any quantity 95.00c.

Calcium Molybdate (Molyte): 40-45%, per lb. contained molybdenum, contract basis, f.o.b. Langeloth and Washington, Pa., any quantity, 80.00c.

Molybdic Oxide Briquets: 48-52%, per lb. contained molybdenum, f.o.b. Langeloth, Pa., any quantity 80.00c.

Molybdenum Oxide: 53-63%, per lb. contained molybdenum in 5 and 20 lb. molybdenum contained cans, f.o.b. Langeloth and Washington, Pa., any quantity 80.00c.

Molybdenum Powder: 99% per lb. in 200-lb. kegs, f.o.b. York, Pa. $2.60; 100-200 lb. lots $2.75; under 100-lb. lots $3.00.

Ferrophosphorus: 17-19%, based on 18% phosphorus content, with unitage of $3 for each 1% of phosphorus above or below the base; gross tons per carload f.o.b. sellers' works, with freight equalized with Rockdale, Tenn.; contract price $58.50, spot $62.25.

Ferrophosphorus: 23-26%, based on 24% phosphorus content, with unitage of $3 for each 1% of phosphorus above or below the base; gross tons per carload f.o.b. sellers' works, with freight equalized with Mt. Pleasant, Tenn.; contract price $75, spot $80.

Ferrosilicon: Carloads, unpacked, Eastern zone, 25%, 9.75c to 12.15c lb. Si. contained; 50%, 6.65c to 8.10c; 60% 7.70c to 9c; 75% 8.05c to 9.05c; 85% 8.90c to 9.85c; 95% 11.05c to 12.45c, according to crushed size. Central zone add .15c to .80c lb. cont. Si., l.c.l. add .45c to 3.35c; Western zone add .6c to 2c, l.c.l. 9c to 11.05c. Prices F.O.B. shipping point, freight allowed to destination.

Silicon Metal: 96% Si. 2% Fe. max., 12.50c to 14.85c per lb.; 97% Si. 1% Fe., 12.90c to 16.25c per lb., according to crushed size, f.o.b. shipping point, freight allowed.

Silicon Briquets: Contract basis: in carloads, bulk freight allowed, per ton $74.50; packed $80.50; ton lots $84.50; less-ton lots per lb. 4.00c; less 200-lb. lots per lb. 4.25c. Spot ¼-cent per lb. higher on less-ton lots; $5 per ton higher on ton lots and over.

Silicomanganese: Same zones as ferrosilicon, eastern zone, 5.3c to 7c per lb.; central zone, add 1.4c to 1c per lb.; western zone, add 55.c to 3.05c per lb.

Standard Ferromanganese Briquets: 6.05c per lb. Same zones and differentials as Silicomanganese.

Ferrotungsten: Carlots, per lb. contained tungsten, $1.90.

Tungsten Metal Powder: 98-99%, per lb. any quantity $2.55-2.65.

Ferrotitanium: 40-45%, f.o.b. Niagara Falls, N. Y., per lb. contained titanium; ton lots $1.23; less-ton lots $1.25. Spot up 5 cents per lb.

Ferrotitanium: 20-25%, 0.10 maximum carbon; per lb. contained titanium; ton lots $1.35; less-ton lots $1.40. Spot 5 cents per lb. higher.

High-Carbon Ferrotitanium: 15-20% contract basis, per gross ton, f.o.b. Niagara Falls, N. Y., freight allowed to destinations east of Mississippi River and North of Baltimore and St. Louis, 6-8% carbon $142.50; 3-5% carbon $157.50.

Ferrovanadium: 35-40%, contract basis, per lb. contained vanadium, f.o.b. producers plant with usual freight allowances; open-hearth grade $2.70; special grade $2.80; highly-special grade $2.90.

Vanadium Pentoxide: Technical grade, 88-92 per cent V_2O_5; contracts, any quantity, $1.10 per pound V_2O_5 contained; spot 5 cents up.

Zirconium Alloys: 12-15%, contract basis, carloads bulk, per gross ton $102.50; packed $107.50; ton lots $108; less-ton lots $112.50. Spot $5 per ton higher.

Zirconium alloy: 35-40%, contract basis, carloads in bulk or package, per lb. of alloy 14.00c; gross ton lots 15.00c; less-ton lots 16.00c. Spot ¼-cent higher.

Alsifer: (Approx. 20% aluminum, 40% silicon, 40% iron) contract basis, f.o.b. Niagara Falls, N. Y., per lb. 7.50c; ton lots 8.00c. Spot ¼-cent higher.

Simanal: (Approx. 20% each silicon, manganese, aluminum) Contract basis, freight allowed, per lb. of alloy; carlots 10.00c; ton lots 10.50c, less ton lots, 11.00c.

Borosil: 3 to 4% boron, 40 to 45% Si., $7 lb. cont Bo., f.o.b. Philo, O.

WAREHOUSE STEEL PRICES

Base delivered price, cents per pound, for delivery within switching limits, subject to established extras.

	Hot rolled bars	Structural shapes	Plates	Floor plates	Hot rolled sheets (10 gage base)	Hot rolled bands (12 gage and heavier)	Hot rolled hoops (14 gage and lighter)	Galvanized flat sheets (24 gage base)	Cold rolled sheets (17 gage base)	Cold finished bars	Cold-rolled strip	NE hot bars 8000 series	NE hot bars 9400 series
Boston	4.044[1]	3.912[1]	3.912[1]	5.727[1]	3.774[1]	4.106[1]	5.106[1]	5.224[16]	4.744[16]	4.144[11]	4.715	7.762[28]	6.062[28]
New York	3.853[1]	3.758[1]	3.768[1]	5.574[1]	3.590[1]	3.974[1]	3.974[1]	5.010[23]	4.613[16]	4.103[21]	4.774	.....	.....
Jersey City	3.853[1]	3.747[1]	3.768[1]	5.574[1]	3.590[1]	3.974[1]	3.974[1]	5.010[23]	4.613[16]	4.103[21]	4.774	.....	.....
Philadelphia	3.822[1]	3.666[1]	3.605[1]	5.272[1]	3.518[1]	3.922[1]	4.272[1]	5.018[18]	4.872[26]	4.072[21]	4.772	7.566[28]	5.866[28]
Baltimore	3.802[1]	3.759[1]	3.594[1]	5.252[1]	3.394[1]	3.902[1]	4.252[1]	4.894[1]	4.852[26]	4.052[21]	.....	.....	.....
Washington	3.941[1]	3.930[1]	3.796[1]	5.341[1]	3.596[1]	4.041[1]	4.391[1]	5.196[17]	4.841[26]	4.041[21]	.....	.....	.....
Norfolk, Va.	4.065[1]	4.002[1]	3.971[1]	5.465[1]	3.771[1]	4.165[1]	4.515[1]	5.371[17]	4.965[34]	4.165[21]	.....	.....	.....
Bethlehem, Pa.*	....	3.45[1]	....	....	....	....	....	....	....	....	....	....	....
Claymont, Del.*	....	....	3.45[1]	....	....	....	....	....	....	....	....	....	....
Coatesville, Pa.*	....	....	3.45[1]	....	....	....	....	....	....	....	....	....	....
Buffalo (city)	3.35[1]	3.40[1]	3.63[1]	5.26[1]	3.35[1]	3.819[1]	3.819[1]	4.75[13]	4.40[16]	3.75[21]	4.66	7.35[28]	5.65[28]
Buffalo (country)	3.25[1]	3.30[1]	3.30[1]	4.90[1]	3.25[1]	3.81[1]	3.81[1]	4.65[13]	4.30[16]	3.65[21]	4.35	7.35[28]	5.65[28]
Pittsburgh (city)	3.35[1]	3.40[1]	3.40[1]	5.00[1]	3.35[1]	3.60[1]	3.60[1]	4.75[13]	4.40[24]	3.75[21]	....	7.45[28]	5.75[28]
Pittsburgh (country)	3.25[1]	3.30[1]	3.30[1]	4.90[1]	3.25[1]	3.50[1]	3.50[1]	4.65[13]	4.30[24]	3.65[21]	....	....	....
Cleveland (city)	3.35[1]	3.588[1]	3.40[1]	5.188[1]	3.35[1]	3.60[1]	3.60[1]	4.877[13]	4.40[24]	3.75[21]	4.45	7.556[28]	5.856[28]
Cleveland (country)	3.25[1]	....	3.30[1]	....	3.25[1]	3.50[1]	3.50[1]	....	4.30[24]	3.65[21]	4.35[21]	....	....
Detroit	3.450[1]	3.661[1]	3.609[1]	5.251[1]	3.450[1]	3.700[1]	3.700[1]	5.00[13]	4.500[24]	3.800[21]	4.659	7.680[28]	5.980[28]
Omaha (city, delivered)	4.115[1]	4.165[1]	4.165[1]	5.765[1]	3.865[1]	4.215[1]	4.215[1]	5.608[10]	5.443[24]	4.443[21]	....	....	....
Omaha (country, base)	4.015[1]	4.065[1]	4.065[1]	5.665[1]	3.765[1]	4.115[1]	4.115[1]	5.508[10]	....	....	....	....	....
Cincinnati	3.611[1]	3.691[1]	3.661[1]	5.291[1]	3.425[1]	3.675[1]	3.675[1]	4.825[10]	4.475[24]	4.011[21]	4.711	6.10	6.20
Youngstown, O.*	....	....	....	....	....	....	....	4.40[13]	....	....	....	....	....
Middletown, O.*	....	....	....	....	3.25[1]	3.50[1]	3.50[1]	4.65[10]	....	....	....	....	....
Chicago (city)	3.50[1]	3.55[1]	3.55[1]	5.15[1]	3.25[1]	3.60[1]	3.60[1]	5.231[15]	4.20[24]	3.75[21]	4.65	5.75[28]	5.85[28]
Chicago (country)	3.40[1]	3.45[1]	3.45[1]	5.05[1]	3.15[1]	3.50[1]	3.50[1]	4.85[15]	4.10[24]	3.65[21]	4.55	5.75[28]	5.85[28]
Milwaukee	3.637[1]	3.687[1]	3.687[1]	5.287[1]	3.387[1]	3.737[1]	3.737[1]	5.272[15]	4.337[24]	3.887[21]	4.787	5.987[28]	6.087[28]
St. Paul	3.73[3]	3.80[3]	3.80[3]	5.40[3]	3.50[3]	3.85[3]	3.85[3]	5.00[3]	4.35[3]	4.34[21]	3.83	7.70[28]	6.00[28]
St. Louis	3.64[1]	3.69[1]	3.69[1]	5.29[1]	3.39[1]	3.74[1]	3.74[1]	4.99[10]	4.24[26]	4.02[21]	3.61	7.72[28]	6.02[28]
Indianapolis (city)	3.60[1]	3.70[1]	3.70[1]	5.30[1]	3.45[1]	3.75[1]	3.75[1]	5.01[10]	4.25[26]	3.97[21]	....	....	....
Indianapolis (country)	3.35[1]	3.45[1]	3.40[1]	5.05[1]	3.20[1]	3.50[1]	3.50[1]	5.01[10]	4.00[26]	3.97[21]	....	....	....
Memphis, Tenn.	3.90[5]	3.95[5]	3.95[5]	5.71[5]	3.85[5]	4.10[5]	4.10[5]	5.25[11]	4.66[26]	4.31[21]	....	....	....
Birmingham (city)	3.50[5]	3.55[5]	3.55[5]	5.83[5]	3.45[5]	3.70[5]	3.70[5]	4.75[10]	4.78[26]	4.43[21]	....	....	....
Birmingham (country)	3.40[5]	3.45[5]	3.45[5]	5.83[5]	3.35[5]	3.60[5]	3.60[5]	4.75[10]	4.78[26]	4.43[21]	....	....	....
New Orleans (city)	4.10[4]	3.90[4]	3.90[4]	5.85[4]	3.95[4]	4.20[4]	4.20[4]	5.25[28]	4.95[10]	4.60[21]	3.00	....	....
New Orleans (country)	4.00[4]	3.80[4]	3.80[4]	5.75[4]	3.85[4]	4.10[4]	4.10[4]	5.15[28]	4.95[10]	4.60[21]	....	....	....
Houston, Tex.	3.75[5]	4.25[5]	4.25[5]	5.50[5]	3.75[5]	4.30[5]	4.30[5]	5.25[30]	5.43[10]	4.50[22]	....	....	....
Los Angeles	4.35[4]	4.60[4]	4.90[4]	7.15[4]	4.95[4]	4.90[4]	6.70[4]	5.95[10]	7.15[3]	5.70[22]	....	9.55[28]	8.35[28]
San Francisco (city)	3.95[7]	4.35[7]	4.65[7]	6.35[7]	4.55[7]	4.50[7]	4.50[7]	6.60[10]	7.55[19]	5.55[19]	....	9.80[3]	8.80[3]
San Francisco (country)	3.85[7]	4.25[7]	4.55[7]	6.25[7]	4.45[7]	4.40[7]	4.40[7]	6.50[19]	7.45[19]	5.45[19]	....	....	....
Tacoma	4.20[6]	4.45[3]	4.75[6]	6.50[6]	4.65[6]	4.25[6]	5.45[6]	5.70[6]	6.63[26]	5.75[22]	....	....	....
Seattle (city)	4.20[6]	4.45[3]	4.75[6]	6.50[6]	4.65[6]	4.35[6]	5.45[6]	5.70[6]	6.63[26]	5.75[22]	....	....	8.00[6]

*Basing point cities, with quotations representing mill prices, plus warehouse spread.

NOTE—All prices fixed by Office of Price Administration in amendments Nos. 10 to 16 to Revised Price Schedule No. 49. Deliveries outside above cities computed in accordance with regulations.

BASE QUANTITIES

[1]—400 to 1999 pounds; [2]—400 to 14,999 pounds; [3]—any quantity; [4]—300 to 1999 pounds; [5]—400 to 3999 pounds; [6]—300 to 1999 pounds; [7]—400 to 39,999 pounds; [8]—under 2000 pounds; [9]—under 4000 pounds; [10]—500 to 1499 pounds; [11]—one bundle to 39,999 pounds; [12]—150 to 2249 pounds; [13]—150 to 1499 pounds; [14]—three to 24 bundles; [15]—450 to 1499 pounds; [16]—one bundle to 1499 pounds; [17]—one to nine bundles; [18]—one to six bundles; [19]—100 to 749 pounds; [20]—300 to 1999 pounds; [21]—1500 to 39,999 pounds; [22]—1500 to 1999 pounds; [23]—1000 to 39,999 pounds; [24]—400 to 1499 pounds; [25]—1000 to 1999 pounds; [26]—under 25 bundles. Cold-rolled strip, 2000 to 39,999 pounds, base.

Ores

Lake Superior Iron Ore
Gross ton, 51½%
Lower Lake Ports

Old range bessemer	$4.75
Mesabi nonbessemer	4.45
High phosphorus	4.35
Mesabi bessemer	4.60
Old range nonbessemer	4.60

Eastern Local Ore
Cents, unit, del. E. Pa.

Foundry and basic 56-63%, contract	13.00

Foreign Ore
Cents per unit, c.i.f. Atlantic ports

Manganiferous ore, 45-55% Fe., 6-10% Mang.	Nom.
N. African low phos.	Nom.
Spanish, No. African basic, 50 to 60%	Nom.
Brazil iron ore, 68-69% f.o.b. Rio de Janeiro	7.50-8.00c

Tungsten Ore

Chinese wolframite, per short ton unit, duty paid	$24.00

Chrome Ore
(Equivalent OPA schedules):
Gross ton f.o.b. cars, New York, Philadelphia, Baltimore, Charleston, S. C., Portland, Ore., or Tacoma, Wash.
(S/S paying for discharging; dry basis; subject to penalties if guarantees are not met.)

Indian and African	
48% 2.8:1	$41.00
48% 3:1	43.50
48% no ratio	31.00
South African (Transvaal)	
44% no ratio	27.40
45% no ratio	28.30
48% no ratio	31.00
50% no ratio	32.80
Brazilian—nominal	
44% 2.5:1 lump	33.65
48% 3:1 lump	43.50
Rhodesian	
45% no ratio	28.30
48% no ratio	31.00
48% 3:1 lump	43.50
Domestic (seller's nearest rail)	
48% 3:1	52.80
less $7 freight allowance	

Manganese Ore
Including war risk but not duty, cents per gross-ton unit, dry, f.o.b. cars, New Orleans and Mobile; 5 cents higher at Norfolk, Baltimore, Philadelphia, New York; adjustments for analysis variations. (Based on OPA schedules.)

Brazilian, 48%	73.8c
Brazilian, 46%	71.8c
Caucasian, 51%	75.3c
Caucasian, 50%	74.8c
Chilean, 48%	73.8c
Indian, 50%	74.8c
Indian, 48%	73.8c
South African, 48%	73.8c
South African, 46%	71.8c
(Duty Free)	
Cuban, 51%	86.5c
Cuban, 48%	85.0c
Cuban, 45%	82.0c
Philippine, 50%	85.0c
Domestic, 48%, f.o.b. mines	100.0c

Molybdenum

Sulphide conc., lb., Mo. cont., mines	$0.75

NATIONAL EMERGENCY STEELS (Hot Rolled)

(Extras for alloy content)

Designation	Carbon	Mn.	Si.	Cr.	Ni.	Mo.	Basic open-hearth Bars per 100 lb.	Basic open-hearth Billets per G T	Electric furnace Bars per 100 lb.	Electric furnace Billets per G T
	Chemical Composition Limits, Per Cent									
NE 1330	.28-.33	1.60-1.90	.20-.35	.....	.....	.....	$ .10	$2.00	....	....
NE 8020	.18-.23	1.00-1.30	.20-.35	.....	.....	.10-.20	.45	9.00	$.95	$19.00
NE 8442	.40-.45	1.30-1.60	.20-.35	.....	.....	.30-.40	.90	18.00	1.40	28.00
NE 8613	.12-.17	.70- .90	.20-.35	.40-.60	.40-.70	.15-.25	.75	15.00	1.25	25.00
NE 8720	.18-.18	.70- .90	.20-.35	.40-.60	.40-.70	.20-.30	.80	16.00	1.30	26.00
NE 9255	.50-.60	.75-1.00	1.80-2.20	.....	.....	.....	.40	8.00	....	....
NE 9262	.55-.65	.75-1.00	1.80-2.20	.20-.40	.....	.....	.65	13.00	....	....
NE 9415	.13-.18	.80-1.10	.40-.60	.20-.40	.20-.50	.08-.15	.80	16.00	1.30	26.00
NE 9442	.40-.45	1.00-1.30	.40-.60	.20-.40	.20-.50	.08-.15	.85	17.00	1.35	27.00
NE 9537	.35-.40	1.20-1.50	.40-.60	.40-.60	.40-.70	.15-.25	1.20	24.00	1.70	34.00
NE 9630	.28-.33	1.20-1.50	.40-.60	.40-.60	.....	.....	.80	16.00	1.30	26.00
NE 9642	.40-.45	1.30-1.60	.40-.60	.40-.60	.....	.....	.85	17.00	1.35	27.00

Extras are in addition to a base price of 2.70c, per pound on finished products and $54 per gross ton on semifinished steel major basing points and are in cents per pound and dollars per gross ton. No prices quoted on vanadium alloy.

MAXIMUM PRICES FIXED BY OPA ON IRON AND STEEL SCRAP

Other than railroad grades quoted on the basis of basing point prices from which shipping point prices and consumers' delivered prices are to be computed. Scrap originating from railroads quoted delivered to consumers' plants located on the line of the railroad from which the material originated. All prices in gross tons. A basing point includes its switching district.

PRICES FOR OTHER THAN RAILROAD SCRAP

					ELECTRIC FURNACE, ACID OPEN-HEARTH AND FOUNDRY GRADES									
					Low Phos. Grades									
	OPEN HEARTH GRADES*	Mixed Bor., Turn., Machine Turnings	Cast Iron Borings	Shoveling Turnings	Billet, Bloom Forge Crops	Bar Crops and smaller; Punchings, Plate	Heavy Structural, Plate 3 ft. and less	2 ft. and less	1 ft. and less	Foundry Steel 2 ft. and less	1 ft. and less	Alloy-Free Low Phos. & Sulphur Turnings	First Cut Heavy Axle & Forge Turnings	Electric Furnace Bundles
Pittsburgh, Brackenridge, Butler, Johnstown, Midland, Monessen, Sharon, Steubenville, Weirton, Canton, Youngstown, Warren	$20.00	$15.00	$16.00	$17.00	$25.00	$22.50	$21.50	$22.00	$22.50	$21.50	$22.00	$18.00	$19.50	$21.00
Claymont, Coatesville, Harrisburg, Conshohocken, Phoenixville.	18.75	13.75	14.75	15.75	23.75	21.25	20.25	20.75	21.25	20.25	20.75	16.75	18.25	19.75
Bethlehem	18.25	13.25	14.25	15.25	23.25	20.75	19.75	20.25	20.75	19.75	20.25	16.25	17.75	19.25
Buffalo	19.25	14.25	15.25	16.25	24.25	21.75	20.75	21.25	21.75	20.75	21.25	17.25	18.75	20.25
Cleveland, Middletown, Cincinnati, Portsmouth, Ashland	19.50	14.50	15.50	16.50	24.50	22.00	21.00	21.50	22.00	21.00	21.50	17.50	19.00	20.50
Detroit	17.85	12.85	13.85	14.85	22.85	20.35	19.35	19.85	20.35	19.35	19.85	15.85	17.35	18.85
Toledo	†15.35	12.85	13.85	14.85										
Chicago	18.75	13.75	14.75	15.75	23.75	21.25	20.25	20.75	21.25	20.25	20.75	16.75	18.25	19.75
Kokomo	18.25	13.25	14.25	15.25	23.25	20.75	19.75	20.25	20.75	19.75	20.25	16.25	17.75	19.25
Duluth	18.00	13.00	14.00	15.00	23.00	20.50	19.50	20.00	20.50	19.50	20.00	16.00	17.50	19.00
St. Louis	17.50	12.50	13.50	14.50	22.50	20.00	19.00	19.50	20.00	19.00	19.50	15.50	17.00	18.50
Birmingham, Atlanta, Alabama City, Los Angeles, San Francisco, Pittsburg, Calif.	17.00	12.00	13.00	14.00	22.00	19.50	18.50	19.00	19.50	18.50	19.00	15.00	16.50	18.00
Minnequa, Colo.	16.50	11.50	12.50	13.50	21.50	19.00	18.00	18.50	19.00	18.00	18.50	14.50	16.00	17.50
Seattle	14.50	9.50	10.50	11.50	19.50	17.00	16.00	16.50	17.00	16.00	16.50	12.50	14.00	15.50

RAILROAD SCRAP

	Heavy Melting Steel	Scrap Rails	Rails for Rolling	Scrap Rails: 3 ft. and under	Scrap Rails: 2 ft. and under	Scrap Rails: 18 in. and under
Pittsburgh, Wheeling, Steubenville, Sharon, Youngstown, Canton	$21.00	$22.00	$23.50	$24.00	$24.25	$24.50
Philadelphia, Wilmington, Sparrows Point	19.75	20.75	22.25	22.75	23.00	23.25
Cleveland, Cincinnati, Middletown, Ashland, Portsmouth	20.50	21.50	23.00	23.50	23.75	24.00
Chicago	19.75	20.75	22.25	22.75	23.00	23.25
Buffalo	20.25	21.25	22.75	23.25	23.50	23.75
Detroit	18.85	19.85	21.35	21.85	22.10	22.35
Kokomo	19.25	20.25	21.75	22.25	22.50	22.75
Duluth	19.00	20.00	21.50	22.00	22.25	22.50
Kansas City, Mo.	17.00	18.00	19.50	20.00	20.25	20.50
St. Louis	18.50	19.50	21.00	21.50	21.75	22.00
Birmingham	18.00	19.00	20.50	21.00	21.25	21.50
Los Angeles, San Francisco	18.00	19.00	20.50	21.00	21.25	21.50
Seattle	15.50	16.50	18.00	18.50	18.75	19.00

CAST IRON SCRAP OTHER THAN RAILROAD

(Shipping point prices in gross tons)

	Group A	Group B	Group C
No. 1 Cupola Cast	$18.00	$19.00	$20.00
No. 1 Machinery Cast, Drop Broken, 150 lbs. & Under	18.00	19.00	20.00
Clean Auto Cast	18.00	19.00	20.00
Stove Plate	17.00	18.00	19.00
Unstripped Motor Blocks	15.50	16.50	17.50
Heavy Breakable Cast	15.50	16.50	17.50
Charging Box Size Cast	17.00	18.00	19.00
Miscellaneous Malleable	20.00	21.00	22.00

Group A includes the states of Montana, Idaho, Wyoming, Nevada, Utah, Arizona and New Mexico.

Group B includes the states of North Dakota, South Dakota, Nebraska, Colorado, Kansas, Oklahoma, Texas and Florida.

Group C includes states not named in groups A and B, plus Kansas City, Kans.-Mo.

*Open Hearth Grades refer to No. 1 heavy melting steel, No. 1 hydraulic compressed black sheet scrap, No. 2 heavy melting steel, dealers' No. 1 bundles, dealers' No. 2 bundles and No. 1 busheling. No. 1 chem. borings, 1 per cent oil, $1 under, No. 2, 1.5 per cent oil, $2 under heavy melting steel. No. 3 bundles, $2 under No. 1 heavy melting; cast steel, $2.50 over, No. 2 busheling, $2.50 under No. 1 heavy melting steel, auto springs, crankshafts, $1 over No. 1 heavy melting. †Toledo open-hearth grades cover only No. 2 busheling.

A basing point includes the switching district of the city named. The Pittsburgh basing point includes the switching districts of Bessemer, Homestead, Duquesne, Munhall and McKeesport, Pa. Cincinnati includes Newport, Ky. St. Louis basing point includes Granite City, East St. Louis and Madison, Ill. San Francisco includes South San Francisco, Niles and Oakland, Calif. Chicago includes Gary, Ind. Claymont, Del., includes Chester, Pa.

Inferior Grades: Maximum prices of inferior grades shall continue to bear the same differential below the corresponding listed grades as existed from Sept. 1, 1940, to Jan. 31, 1941. No premium allowed on grades considered superior, unless approved by OPA. Addition of special preparation charges prohibited. Purchase of electric furnace or foundry grades for open hearth or blast furnace use permitted only at no more than price for corresponding open hearth grade. Exceptions: Low phos. billet, bloom and forge crops and electric furnace bundles may exceed open hearth price, and electric furnace bundles may exceed blast furnace price, if material is delivered to the consumer direct from the original industrial producer.

Commissions: No commission is payable except by a consumer to a broker for services rendered, the commission not to exceed 50 cents per gross ton. No commission is payable unless: The broker guarantees the quality and delivery of an agreed tonnage the scrap is purchased at a price no higher than the maximum allowed; the broker sells the scrap to the consumer at the same price at which he purchased it; the broker does not split the commission with the seller of the scrap, with another broker or sub-broker, or with the consumer. Commissions must be shown as separate item on invoice.

Maximum Shipping Point Price: Where shipment to consumer is by rail, vessel or combination of both, scrap is at its shipping point when it has been placed f.o.b. railroad car or f.a.s. vessel. In such cases, maximum shipping point prices are: (1) For shipping points located within a basing point, the price listed in the above table for scrap at the basing point in which the shipping point is located, minus the lowest established switching charge for scrap within the basing point; and (2) for shipping points located outside a basing point, the price in the above table for scrap at the most favorable basing point, minus the lowest transportation charge by rail, water or combination thereof. When vessel movement is involved, dock charges shall be 50 cents at Memphis, $1 at Great Lakes ports, $1.25 at New England ports, 75 cents elsewhere. New England shipping point prices computed on most favorable basing point prices; maximum transportation charge on scrap from New England, $6.65 per ton.

Scrap shipped by motor vehicle is at its shipping point when loaded. For shipping points within basing points, maximum is price listed in table minus lowest switching charge. When outside basing point, maximum is price at most favorable basing point minus lowest established charge when hauled by common carrier. When hauled by seller charges are based on carload rate for rail shipment, minimum $1.00 per ton.

Maximum Delivered Prices: Determined by adding established transportation charges to shipping point price, not to exceed by more than $1 (plus freight rate increase March 18, 1942) the prices listed in the table for the nearest basing point. Certain exceptions specified in Revised Price Schedule No. 4 (Amendment 1) apply to St. Louis district consumers, to WPB allocations, to water shipments from Duluth or Superior, Wis., to shipments of billets, blooms and forge crops from Pittsburgh and to shipments of electric and foundry grades from Michigan; to shipments of turnings to ferroalloy producers and of borings to chemical users. Delivered prices of scrap shipped under WPB allocations may exceed prices at nearest basing point by more than $1, if most economical transportation is used.

Unprepared Scrap: Above prices are for prepared scrap. Maximum prices for unprepared scrap are $3.50 less; (material from which Nos. 1, 2 and 3 bundles made is $4 less) than for the corresponding grades of prepared scrap, except for heavy breakable cast. In no case shall electric furnace and foundry grades be used as the "corresponding grades of prepared scrap."

Remote Scrap: Consists of all grades, except railroad scrap, in Florida, Montana, Idaho, Wyoming, Nevada, Arizona, New Mexico, Texas, Oklahoma, Oregon, Washington, Louisiana, Utah, Arkansas, Nebraska, Kansas. Delivered price may exceed by not more than $7 the price at the basing point nearest consumer's plant, provided sworn details furnished OPA. Permission required to exceed by more than $7 the nearest basing point price. Colorado is remote for Colorado consumers only.

NONFERROUS METAL PRICES

Copper: Electrolytic or Lake from producers in carlots 12.00c, Del. Conn., less carlots 12.12½, refinery; dealers may add ¾c for 5000 lbs. to carload; 1000-4999 lbs. 1c; 500-999 1½c; 0-499 2c. Casting, 11.75c, refinery for 20,000 lbs., or more, 12.00c less than 20,000 lbs.

Brass Ingot: Carlot prices, including 25 cents per hundred freight allowance; add ¼c for less than 20 tons; 85-5-5-5 (No. 115) 12.25c; 88-10-2 (No. 215) 16.50c; 80-10-10 (No. 305) 14.25c; Navy G (No. 225) 16.75c; Navy M (No. 245) 14.75c; No. 1 yellow (No. 405) 10.00c; manganese bronze (No. 420) 12.75c.

Zinc: Prime western 8.25c, select 8.35c, brass special 8.50c, intermediate 8.75c, E. St. Louis, for carlots. For 20,000 lbs. to carlots add 0.15c; 10,000-20,000 0.25c; 2000-10,000 0.40c; under 2000 0.50c.

Lead: Common 6.35c, corroding or chemical, 6.40c, E. St. Louis for carloads; add 5 points for Chicago, Minneapolis-St. Paul, Milwaukee-Kenosha districts; add 15 points for Cleveland-Akron-Detroit area, New Jersey, New York State, Texas, Pacific Coast, Richmond, Indianapolis-Kokomo; add 20 points for Birmingham, Connecticut, Boston-Worcester-Springfield, New Hampshire, Rhode Island.

Primary Aluminum: 99% plus, ingots 15.00c del., pigs 14.00c del.; metallurgical 94% min. 13.50c del. Base 10,000 lbs. and over; add ½c 2000-9999 lbs.; 1c less than 2000 lbs.

Secondary Aluminum: All grades 14.00c per lb. except as follows: Low-grade piston alloy (No. 122 type) 13.50c; No. 12 foundry alloy (No. 2 grade) 13.50c; chemical warfare service ingot (92½% plus) 13.50c; steel deoxidizers in notchbars, granulated or shot, Grade 1 (95-97½%) 13.50c, Grade 2 (92-95%) 13.50c, Grade 3 (90-92%) 13.00c, Grade 4 (85-90%) 12.50c; any other ingot containing over 1% iron, except PM 754 and hardeners, 13.50c. Above prices for 30,000 lb. or more; add ¼c 10,000-30,000 lb.; ½c 1000-10,000 lbs.; 1c less than 1000 lbs. Prices include freight at carload rate up to 75 cents per hundred.

Magnesium: Commercially pure (99.8%) standard ingots (4-notch, 17 lbs.) 20.50c lb.; add 1c for special shapes and sizes, including 3-lb. ingot and 12-lb. round ingot; incendiary bomb alloy 23.40c, 50-50 magnesium-aluminum 23.75c, ASTM B80-41T No. 11 25.00c, ASTM B94-40T No. 13 25.00c, all others 23.00c. Prices for 100 lbs. or more; for 25-100 lbs. add 10c; for less than 25 lbs. 20c; incendiary bomb alloy f.o.b. plant any quantity; carload freight rate allowed all others for 500 lbs. or more.

Tin: Prices ex-dock, New York in 5-ton lots. Add 1 cent for 2240-11,199 lbs., 1½c 1000-2239, 2½c 500-999, 3c under 500. Grade A, 99.8% or higher (includes Straits), 52.00c; Grade B, 99.75-99.79% incl. 51.62½c; Grade C, Cornish refined 51.62½c; Grade D, 99.0-99.74% incl. 51.12½c; Grade E, below 99%, 51.00c.

Antimony: American, bulk, carlots, f.o.b. Laredo, Tex., 99.0-99.8% grade 14.50c, 99.8% and over (arsenic 0.05% max.; no other impurity to exceed 0.1% 15.00c. Add ¼c for less-carlots to 10,000 lbs.; ½c for 9999-224 lbs.; 2c for 223 lbs. and less.

Nickel: Electrolytic cathodes, 99.5%, f.o.b. refinery 35.00c lb.; pig and shot produced from electrolytic cathodes 36.00c; "F" nickel shot or ingot for additions to cast iron, 34.00c; Monel shot 28.00c.

Mercury: Prices per 76-lb. flask f.o.b. point of shipment or entry. Domestic produced in Calif., Oreg., Wash., Idaho, Nev., Ariz. $191; produced in Texas, Ark. $193. Foreign, produced in Mexico, duty paid, $193.

Arsenic: Prime, white, 99%, carlots, 4.00c lb.

Beryllium-Copper: 3.75-4.25% Be., $15 lb. contained Be.

Cadmium: Bars, ingots, pencils, pigs, plates, rods, slabs, sticks and all other "regular" straight or flat forms 90.00c lb., del.; anodes, balls, discs and all other special or patented shapes 95.00c lb. del.

Cobalt: 97-99%, $2.11 lb.; 100 lbs. or more on contract, $1.50 lb.

Indium: 99.5%, $10 per troy ounce.

Gold: U. S. Treasury, $35 per ounce.

Silver: Open market, N. Y. 44.75c per ounce.

Platinum: $36 per ounce.

Iridium: $165 per troy ounce.

Palladium: $24 per troy ounce.

Rolled, Drawn, Extruded Products

(Copper and brass product prices based on 12.00c, Conn., for copper. Freight prepaid on 100 lbs. or more.)

Sheet: Copper 20.87c; yellow brass 19.48c; commercial bronze, 90% 21.07c, 95% 21.26c; red brass, 80% 20.15c, 85% 20.36c; phosphor bronze, Grades A, B 5% 36.25c; Everdur, Herculoy, Duronze or equiv. 26.00c; naval brass 24.50c; manganese bronze 28.00c; Muntz metal 22.75c; nickel silver 5% 26.50c.

Rods: Copper, hot-rolled 17.37c, cold-rolled 18.37c; yellow brass 15.01c; commercial bronze 90% 21.32c, 95% 21.53c; red brass 80% 20.40c, 85% 20.61c; phosphor bronze Grade A, B 5% 36.50c; Everdur, Herculoy, Duronze or equiv. 25.50c; Naval brass 19.12c; manganese bronze 22.50c; Muntz metal 18.87c; nickel silver 5% 28.75c.

Seamless Tubing: Copper 21.37c; yellow brass 22.23c; commercial bronze 90% 23.47c; red brass 80% 22.80c, 85% 23.01c.

Extruded Shapes: Copper 20.87c; architectural bronze 19.12c; manganese bronze 24.00c, Muntz metal 20.12c; Naval brass 20.37c.

Angles and Channels: Yellow brass 27.98c; commercial bronze 90% 29.57c, 95% 29.78c; red brass 80% 28.65c, 85% 28.86c.

Copper Wire: Bare, soft, f.o.b. Eastern mills, carlots 15.37½c, less-carlots 15.87½c; weatherproof, f.o.b. Eastern mills, carlots 17.00c, less-carlots 17.50c; magnet, delivered, carlots 17.50c, 15,000 lbs. or more 17.75c, less carlots 18.25c.

Aluminum Sheets and Circles: 2s and 3s, flat, mill finish, base 30,000 lbs. or more; del.; sheet widths as indicated; circle diameters 9" and larger:

Gage	Width	Sheets	Circles
.249"-7	12"-48"	22.70c	25.20c
8-10	12"-48"	23.20c	25.70c
11-12	26"-48"	24.20c	27.00c
13-14	26"-48"	25.20c	28.50c
15-16	26"-48"	26.40c	30.40c
17-18	26"-48"	27.90c	32.90c
19-20	24"-42"	29.80c	35.30c
21-22	24"-42"	31.70c	37.20c
23-24	3"-24"	25.60c	29.20c

Lead Products: Prices to jobbers; full sheets 9.50c; cut sheets 9.75c; pipe 8.15c, New York; 8.50c Philadelphia, Baltimore, Rochester and Buffalo; 8.75c, Chicago, Cleveland, Worcester, Boston.

Zinc Products: Sheet f.o.b. mill, 13.15c; 36,000 lbs. and over deduct 7%. Ribbon and strip 12.25c, 3000-lb. lots deduct 1%, 6000 lbs. 2% 9000 lbs. 3%, 18,000 lbs. 4%, carloads and over 7%. Boiler plate (not over 12") 3 tons and over 11.00c; 1-3 tons 12.00c; 500-2000 lbs. 12.50c; 100-500 lbs. 13.00c; under 100 lbs. 14.00c. Hull plate (over 12") add 1c to boiler plate prices.

Plating Materials

Chromic Acid: 99.75%, flake, del., carloads 16.25c; 5 tons and over 16.75c; 1-5 tons 17.25c; 400 lbs. to 1 ton 17.75c; under 400 lbs. 18.25c.

Copper Anodes: Base 2000-5000 lbs., del.; oval 17.62c; untrimmed 18.12c; electro-deposited 17.37c.

Copper Carbonate: 52-54% metallic cu; 250 lb. barrels 20.50c.

Copper Cyanide: 70-71% cu, 100-lb. kegs or bbls. 34.00c f.o.b. Niagara Falls.

Sodium Cyanide: 96%, 200-lb. drums 15.00c; 10,000-lb. lots 13.00c f.o.b. Niagara Falls.

Nickel Anodes: 500-2999 lb. lots; cast and rolled carbonized 47.00c; rolled, depolarized 48.00c.

Nickel Chloride: 100-lb. kegs or 275-lb. bbls. 18.00c lb., del.

Tin Anodes: 1000 lbs. and over 58.50c, del.; 500-999 59.00c; 200-499 59.50c; 100-199 61.00c.

Tin Crystals: 400 lb. bbls. 39.00c f.o.b. Grasselli, N. J.; 100-lb. kegs 39.50c.

Sodium Stannate: 100 or 300-lb. drums 36.50c, del.; ton lots 33.50c.

Zinc Cyanide: 100-lb. kegs or bbls. 33.00c, f.o.b. Niagara Falls.

Scrap Metals

Brass Mill Allowances: Prices for less than 15,000 lbs. f.o.b. shipping point. Add ¾c for 15,000-40,000 lbs.; 1c for 40,000 lbs. or more.

	Clean Heavy	Rod Ends	Clean Turnings
Copper	10.250	10.250	9.500
Tinned Copper	9.625	9.625	9.375
Yellow Brass	8.625	8.375	7.875
Commercial bronze 90%	9.375	9.125	8.625
95%	9.500	9.250	8.750
Red Brass, 85%	9.125	8.875	8.375
Red Brass, 80%	9.125	8.875	8.375
Muntz metal	8.000	7.750	7.250
Nickel Sil., 5%	9.250	9.000	4.625
Phos. br., A. B. 5%	11.00	10.750	9.750
Herculoy, Everdur or equivalent	10.250	10.000	9.250
Naval brass	8.250	8.000	7.500
Mang. bronze	8.250	3.000	7.500

Other than Brass Mill Scrap: prices apply on material not meeting brass mill specifications and are f.o.b. shipping point; add ¾c for shipment of 60,000 lbs. of one group and ¼c for 20,000 lbs. of second group shipped in same car. Typical prices follow:

(Group 1) No. 1 heavy copper and wire, No. 1 tinned copper, copper borings 9.75c; No. 2 copper wire and mixed heavy copper, copper tuyeres 8.75c.

(Group 2) soft red brass and borings, aluminum bronze 9.00c; copper-nickel and borings 9.25c; car boxes, cocks and faucets 7.75c; bell metal 15.50c; babbitt-lined brass bushings 13.00c.

(Group 3) zincy bronze borings, Admiralty condenser tubes, brass pipe 8.00c; Muntz metal condenser tubes 7.50c; yellow brass 6.25c; manganese bronze (lead 0.00%-0.40%) 7.25c, (lead 0.41%-1.0%) 6.25c; manganese bronze borings (lead 0.00-0.40%) 6.50c, (lead 0.41-1.00%) 5.50c.

Aluminum Scrap: Prices f.o.b. point of shipment, respectively for lots of less than 1000 lbs.; 1000-20,000 lbs. and 20,000 lbs. or more, plant scrap only. Segregated solids: S-type alloys (2S, 3S, 17S, 18S, 24S, 32S, 52S) 9.00c, 10.00c, 10.50c; All other high grade alloys 8.50c, 9.50c, 10.00c; low grade alloys 8.00c, 9.00c, 9.50c. Segregated borings and turnings: Wrought alloys (17S, 18S, 32S, 52S) 7.50c, 8.50c, 9.00c; all other high grade alloys 7.00c, 8.00c, 8.50c; low grade alloys 6.50c, 7.50c, 8.00c. Mixed plant scrap, all solids, 7.50c, 8.50c, 9.00c; borings and turnings 5.50c, 6.50c, 7.00c.

Lead Scrap: Prices f.o.b. point of shipment. For soft and hard lead, including cable lead, deduct 0.55c from basing point prices for refined metal.

Zinc Scrap: New clippings, old zinc 7.25c f.ob. point of shipment; add ½-cent for 10,000 lbs. or more. New die-cast scrap, radiator grilles 4.95c; add ½c 20,000 or more. Unsweated zinc dross, die cast slab 5.80c any quantity.

Nickel, Monel Scrap: Prices f.o.b. point of shipment; add ½c for 2000 lbs. or more of nickel or cupro-nickel shipped at one time and 20,000 lbs. or more of Monel. Converters (dealers) allowed 2c premium.

Nickel: 98% or more nickel and not over ½% copper 26.00c; 90-98% nickel, 26.00c per lb. nickel contained.

Cupro-nickel: 90% or more combined nickel and copper 26.00c per lb. contained nickel, plus 8.00c per lb. contained copper; less than 90% combined nickel and copper 26.00c for contained nickel only.

Monel: No. 1 castings, turnings 15.00c; new clipping 20.00c; soldered sheet 18.00c.

Sheets, Strip . . .

Sheet & Strip Prices, Page 154

Fourth quarter sheet capacity is filling rapidly. Practically all sellers are booked through October on hot and cold-rolled sheets, while some have little or nothing left for November. In fact, at least two producers have nothing to offer on cold-rolled sheets before December, due primarily to the diversion of facilities to strip-plate rather than to special demand for cold sheets.

Under recent modifications, producers, when unable to roll a tonnage in the month specified, tentatively book the order where possible within the succeeding two months, promptly advising the customer to that effect. Where this is not satisfactory the consumer must advise the mill within seven days. This new procedure is resulting in less shopping around by the buyer, although the question arises as to why the buyer is willing to let the matter go at that when apparently he wants the tonnage for a specific month and when, theoretically at least, there is under the allotment system capacity somewhere to fill his needs for a given month. Otherwise he would not be given an allotment number for that particular time.

As some trade leaders point out, however, this matter of shopping around is not as simple as it may seem, especially where the buyer is a fabricator engaged in special drawing operations. He has his dies and equipment adjusted, perhaps, to the use of a certain type of sheet (sheets are still a tailor-made commodity to a considerable degree). To use a sheet produced by some other than his regular mill might make it necessary for him first to experiment with a couple of carlots or so, thus delaying his production. Consequently a consumer in this position is disposed to stick to one producer if he can possibly arrange to do so.

Of course, theoretically in such cases, and actually done in various instances, special directives are issued. However, there apparently are more cases where a buyer can arrange to wait than there are special directives.

Also, in the matter of shopping around, there is the question not infrequently of extra freight charges which might deter a consumer and prompt him to rearrange his schedule so that he could accept a later delivery if at all possible.

Drum-containers account for a large tonnage of sheet capacity and mills committed heavily to that program appear to be most extended on deliveries; gages for 55-gallon units are sold into December with some producers. Indications are drums will absorb 3,500,000 to 4,000,000 tons this year. Demand for hot and cold sheets in some sections is not notably heavy, in New England for instance, but with a large portion of the available tonnage taken up by fixed requirements and much sheet capacity engaged on plates, the supply for miscellaneous uses is tight. This is also true of galvanized; demand is light, but supply is small.

Bars . . .

Bar Prices, Page 154

While there are still some cancellations, due to changes in the war program, the gaps are quickly filled, with a result that in general bar producers are well sold for the next four months. Some orders can still be taken for October delivery, but they are the exception. On large rounds and squares most producers have little to offer until late November and when it comes to specially treated alloy bars they are booked up for the remainder of the year and in certain instances well beyond. Cold-drawn carbon bar sellers are promising November delivery in most cases.

In the New York district principal demand is from the aircraft and shipbuilding industry, requirements of one being about as heavy as the other, according to some sellers. Requirements of machine tool builders continue to ease off. Shell requirements are being sustained, but in certain other types of ordnance such as gun mounts and jeeps, orders are coming through less briskly.

Columbia Steel Co., San Francisco, has filed a price of 2.55c, dock, Pacific ports, on reinforcing bars, the former quotation being 2.80c, dock.

Pipe . . .

Pipe Prices, Page 155

Under a recent regulation, pipe producers are not permitted to ship warehouse load tonnage to jobbers who have more than 90 days stock on consignment. This means that some shipments will have to be restricted until inventories can be pared down. Meanwhile, the movement of merchant pipe is light, but with the lag more than offset by continued heavy buying of mechanical and boiler tubing. Deliveries of this tubing are extended several months, with

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some producers having little to offer before the end of this year.

Stocks of standard pipe held by jobbers have reached a minimum in view of the heavy volume of demand which is already developing under maintenance and repair program. Necessary civilian repairs must now be satisfied by pipe out of plumbers' stocks, by used pipe, or by patchwork. The situation in standard pipe is developing a critical side which may force some action aimed at increasing the flow before the year is out. Heavily increased demand for boiler tubes is expected as a result of new orders for locomotives, as well as need for more repair jobs on existing motive power.

Wire . . .

Wire Prices, Page 155

Wire mill schedules under full operation of CMP are full for the third quarter on many specialties. Long processing is required for much of this volume and capacity for some products is practically engaged for fourth quarter. The same holds for the large tonnage wire materials, rope, armor wire, signal, cable and bullet core steel. Unless unforeseen revisions in requirements develop, production of these will continue at the present high rate for the remainder of the year. Welding wire will establish a new tonnage record this year.

There are rumors of checks against consumer inventories of wire, some of which are reported heavy. Among consuming industries demand for aircraft is mounting. Music wire and spring material is sold well into fourth quarter; some aircraft orders have been placed as far ahead as August, next year. Considerable volume of finished wire entering into war programs is galvanized, with zinc supplies ample. Tin is tighter than zinc for wire needs, but the volume of tinned wire is not notably large.

Screw manufacturers continue to be substantial buyers of wire, both finished and in rod form. Nails with some mills have eased slightly, although several mills have nailmaking capacity sold for the remainder of the year. The falling off in building construction has been largely offset by demand for crating and boxing for which requirements of cement-coated nails are heavy.

Rails, Cars . . .

Track Material Prices, Page 155

The backbone of present carbuilding operations is work for the armed services. While there is more actual construction for domestic account at present, military requirements still loom much the larger.

Current domestic car construction is against the 20,000-car program originally scheduled for first half, but greatly delayed in getting under way because of the difficulty builders had in getting steel. In fact, a good portion of the tonnage was not shipped until May and later.

Meanwhile, little new domestic inquiry is current pending action in Washington on steel. Lists have been compiled by the carriers, with a program formulated through the Association of American Railroads. This program has apparently been approved by the Office of Defense Transportation. However, the availability of materials is still a question. The carriers are hopeful of getting steel for this program, at least part of it, in fourth quarter.

Structural Shapes . . .

Structural Shape Prices, Page 155

Shipbuilding absorbs the largest tonnage of structural steel, output with some mills ranging from 80 to 85 per cent for ships. For this fabrication approximately a dozen sizes cover most shapes and mills are well loaded with light sections, while down on other sizes. August delivery is possible with most producers. Restrictions on use of steel in building construction have not eased under CMP and have tightened as a rule. Quotations on ship assembly work by shops figuring subcontracts are frequently widely spread, in some cases up to $50 a ton difference between the high and low estimates. However, some contracts are not placed on a price basis, but rather on delivery and the desirability of getting work into some small shops.

Shop welding departments are well filled, but of late more riveted subassemblies are being placed. This is welcomed by some, experiencing difficulty with welders. Much steel required by structural shops for current type of fabrication is plates; the volume of shapes is often reduced to a fraction of that normally consumed.

In the construction field, continued expansion in the aluminum producing industry accounts for several thousand tons, but in other directions demand is light. Fabricators sometimes experience trouble in obtaining larger sections to round out a job, with 25 to 50 tons miss-

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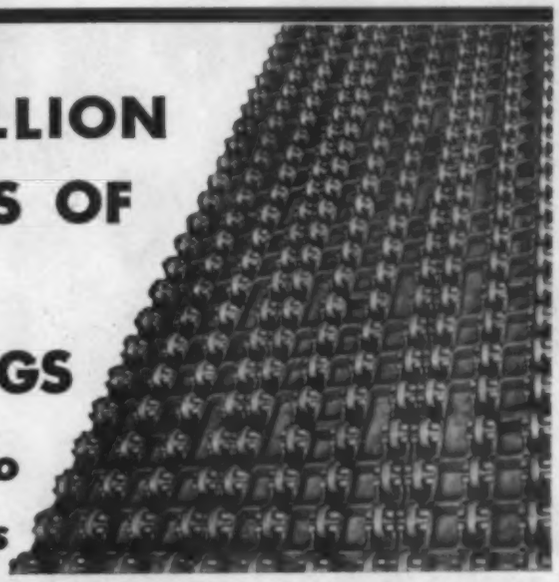

MICHIANA ROLLER HEARTH

● In a large eastern drop forging plant more than 32 million pounds of shell forgings had passed over the MICHIANA Roller Hearth at normalizing temperature at the time records were checked early this year. Still going strong and good for more millions—the hearth and furnace design employed has provided unusually low cost heat treatment both with city gas and fuel oil.

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ing at the last stage of a building job. Several contracts have been shifted from one shop to another for this reason. More gas-cut shapes to replace castings are under consideration for the army and locomotive building program. Shell rounds are rolled on some structural mills, but overall rolling schedules are uneven, due largely to a concentration of sizes in lighter sections.

Structural steel sellers are still hopeful that the War Production Board will see fit to expand the allotment of steel to be converted into structural material. Despite stringent restrictions on its use in various types of construction, there is still more demand than supply. There is also a tendency on the part of the Conservation Division to be more lenient in structural steel specifications and the forthcoming new issue of the design guide reportedly has a more liberal interpretation of applications for structural steel. Jobbers report substantial stocks of structural material although not all in the wanted sizes. A fair volume of used structurals, as well as second grade and rejects, is being handled through steel jobbers.

Pig Iron . . .

Pig Iron Prices, Page 156

With applications for August pig iron last week, the WPB-900 forms appeared for the first time, substituting for the PD-69 forms. These forms, it is said, differ somewhat as to general pattern from the PD-69 applications, but cover much the same detail and are to apply until at least Sept. 5, when M-17, covering the allocation of pig iron, is due either for extension or expiration.

The new forms were issued directly to consumers, although not all apparently received them in time for use in making out their August applications, as quite a few used the old forms.

Some sellers report that August requests from the gray iron foundries are down somewhat, although others declare they see little change. One reason given for the lighter August tonnage is that a number of foundries decided, after they had made out their requests for July, to suspend operations for a week. Quite a few closed down during the July 4 holiday, and still others are down during the current week. Some also closed down late in June, and, all in all, there are many more suspensions this year than last. Consequently, a number will have more iron on hand at the end of July than they originally anticipated.

Consumption of foundry pig iron in the New York and eastern Pennsylvania area is noticeably less as numerous foundries close for vacations and inventory taking. Decline in demand for iron castings has caused more to close than at this time last year. This was reflected in requests for foundry iron for July delivery.

Melt by gray iron foundries in New England continues to contract and while July deliveries will be smaller, inventories are maintained and are slightly heavier in some cases. Consumption thus far this month is slightly better than half that reached during the peak demand for gray iron castings last year. That peak was also attained without full contribution of foundries in the textile equipment, paper and heating industries, restricted by limitations on their products, which have not yet been lifted materially. These factors, coupled with the decline with jobbing shops and machine tool suppliers, have slackened demand for foundry grades. In contrast, requirements for basic and malleable are maintained. Use of malleable in gray iron shop melts to meet specifications is frequent. In most cases where consumption of iron has declined, inventories of scrap are relatively much heavier than pig iron, due to limitations on the latter.

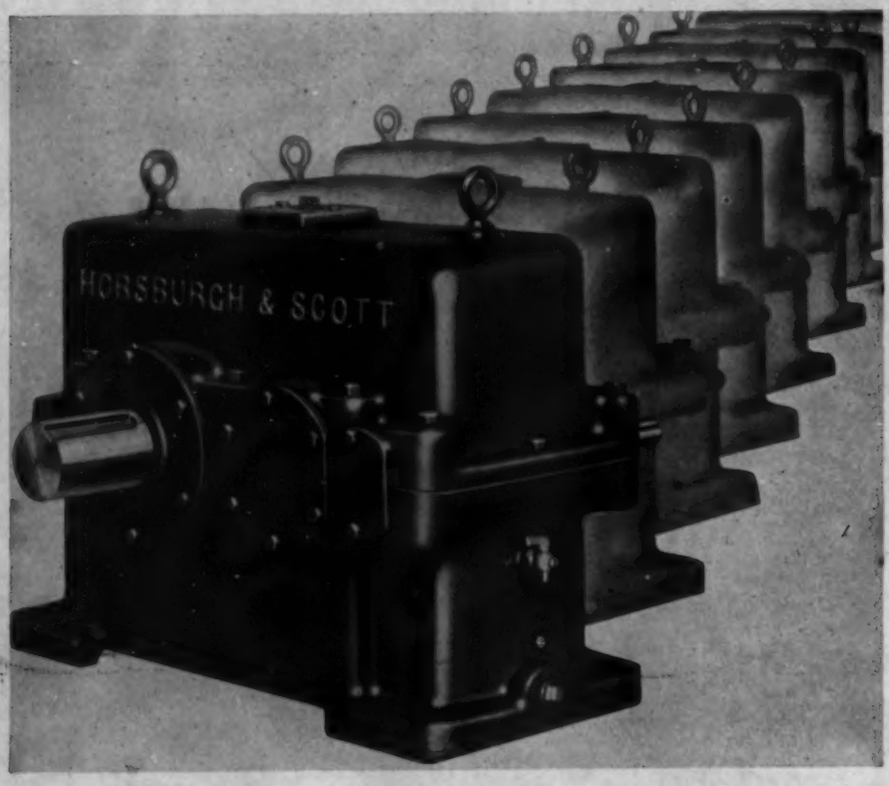
Scrap . . .

Scrap Prices, Page 158

Developments in the steel and iron scrap market include an increased supply of low phosphorus grades, contrasting sharply with the situation a few months ago, continued heavy demand for heavy breakable cast and, in general, further decline in yard scrap collections. Supply is plentiful in nearly all grades but apprehension persists that the latter factor will cause a squeeze in supply within the next three months.

Pittsburgh melters find heavy melting steel in good supply and there is little demand for inferior grades. Demand for low and medium alloy turnings is increasing as supply is much smaller than a short time ago due to heavy pressure for use of this material. Installation of crushing facilities has made it possible to use more of this grade.

Movement of scrap from territory serving the St. Louis district has increased moderately as effects of the spring floods



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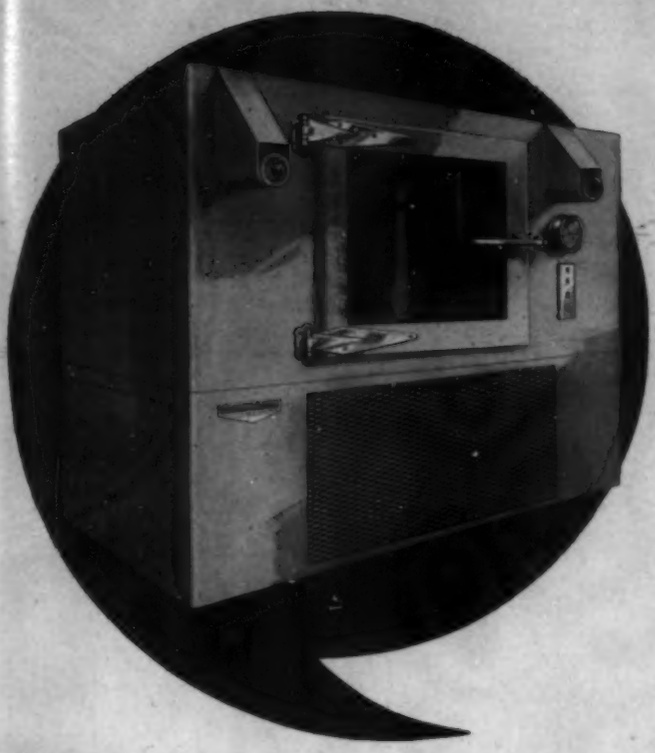

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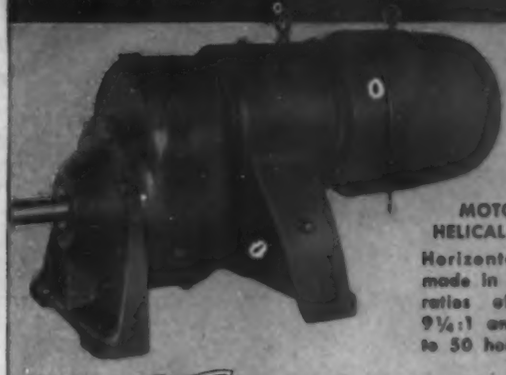

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grow less, allowing transportation by truck. Dealers have larger stocks but meet difficulty in preparation because of labor shortage. Mill stocks run from ten days to four weeks. Recent allocations of railroad scrap to two mills relieved threatening shortage.

In New England carbon steel borings and turnings are moving well but mixed alloys are slow except when allocated. Best grades of open-hearth and electric furnace steel scrap are allocated, but destinations are usually in areas normally supplied by eastern shippers, eastern Pennsylvania for the most part, with some New England scrap going to Pittsburgh. More bushy turnings are being crushed at the point of origin. Shipyard scrap is produced in heavier volume, also from gas cutting of shapes. Demand for this material is brisk. Most industrial steel scrap moves into consuming channels, light alloy plant material lagging. Tonnage reaching dealers' yards in the east continues small and demand for foundry grades is light; numerous consumers have withdrawn commitments.

WPB Plans To Move Isolated Scrap Stocks

A plan for distribution of certain steel and iron scrap has been announced by H. G. Batcheller, director, Steel Division, War Production Board. The board has had difficulty in moving remote scrap to steel mills because of high delivered cost resulting from freight charges. Even where remote scrap has not been involved, difficulty has been encountered in moving other scrap. The new plan is proposed to assure movement to points of consumption and avoid large accumulations in collection areas.

It provides that an industry representative in each scrap consuming district be named by consumer mills in the area to act as a point of contact in expediting movement of any scrap the WPB may request to have moved in that district. When any accumulation fails to move in the normal way the Salvage Division will inform the Steel Division and request the latter to take action to move it.

The Steel Division then will decide to what consuming area the scrap should move and communicate with the industry representative, the latter to consult with consumers and give the Steel Division their recommendation how it should be allocated. The Steel Division then will review the proposed division and after consultation with the industry representative will make any changes that appear necessary and issue allocation orders to move the scrap to these individual consumers. Each consumer then is bound to take the scrap allocated to him at the applicable OPA ceiling price.

Some dealers who have had tonnages of material, notably borings and turnings, difficult to move, believe their efforts for relief have been one cause of this plan to take care of scrap stymied in various locations.

To Make Army Beds From Scrap Rails

Contracts for approximately 425,000 folding metal beds for the army have been distributed by the Quartermaster Corps. Scrap rails will be rerolled for the channels and angles without diverting any steel from other essential uses. For some time the army has been purchasing beds of wooden construction. A formed steel part which clamps on the legs of barrack bunks permits double-decking with the metal unit when necessary.

Tin Plate . . .

Tin Plate Prices, Page 155

New estimates of tin plate demand from packers indicate that the volume estimates made earlier this year will probably hold, although the season is coming along slowly and peak demand will probably come later than normal, due primarily to weather conditions. The situation in electrolytic tin plate is still somewhat confused. There is not enough new business to maintain operations on the units which are already in production, yet the War Production Board is speeding work and increasing priorities to expedite completion of the remaining units. Lacquering facilities will probably be the primary bottleneck in the canning program since in many cases it has been most difficult for the canners to build up a sufficient inventory of prepared plate.

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Fluorspar Ceiling Prices Raised $5 a Ton by OPA

Office of Price Administration has announced general increases of about $5 a ton in maximum prices for all grades of fluorspar, effective as of July 1. These were authorized in revised maximum price regulation No. 126.

Of the $5 increase, approximately $3.50 is to permit absorption of higher wage costs by producers. The remaining $1.50 is granted to stimulate production and development of new fields as desired by the War Production Board.

OPA reserves the right to revoke the $1.50 portion of the increase granted to encourage production if it appears new development is not being encouraged in the degree necessary.

To encourage production and sale of low grade metallurgical fluorspar, the new maximum prices are to be effective only for a period of 60 days. After the 60-day period, the prices for fluorspar with an effective calcium fluoride content in excess of 60 per cent may be charged only on sales approved by the WPB.

New maximum prices for metallurgical fluorspar are $30 to $33 a ton, depending upon the grade sold. New ceiling prices for acid and ceramic grades are $37 a ton, with adjustments for freight differentials.

The revised regulation continues the exemption of crude fluorspar ores and provides also that toll agreements for grinding, milling or other processing of crude ores shall be exempt from price control.

Season Iron Ore Total Lags Further Behind '42

Shipments of iron ore by Great Lakes is falling further behind the record of last year, tonnage in June being 760,701 gross tons less than the corresponding month in 1942, according to the Lake Superior Iron Ore Association, Cleveland. This increased the cumulative loss from 8,937,575 tons at the end of May to 9,158,276 tons at the end of June. Adverse weather conditions caused June to fall below last year's total, the percentage being 6.03. For the season to July 1 the loss is 26.97 per cent from the 1942 tonnage.

Shipments in June totaled 11,864,401 tons, compared with 10,974,672 tons in May, a slight increase. Details of May loadings are as follows:

	June, 1943	June, 1942
Escanaba	701,756	836,190
Marquette	719,324	604,728
Ashland	816,783	961,220
Superior	4,221,142	4,675,885
Duluth	2,792,375	3,008,149
Two Harbors	2,551,565	2,470,887
Total, U. S.	11,802,945	12,557,059
Michipicoten	61,456	68,043
Grand total	11,864,401	12,625,102
Decrease from year ago		760,701

Cumulative loadings to July 1 are as follows:

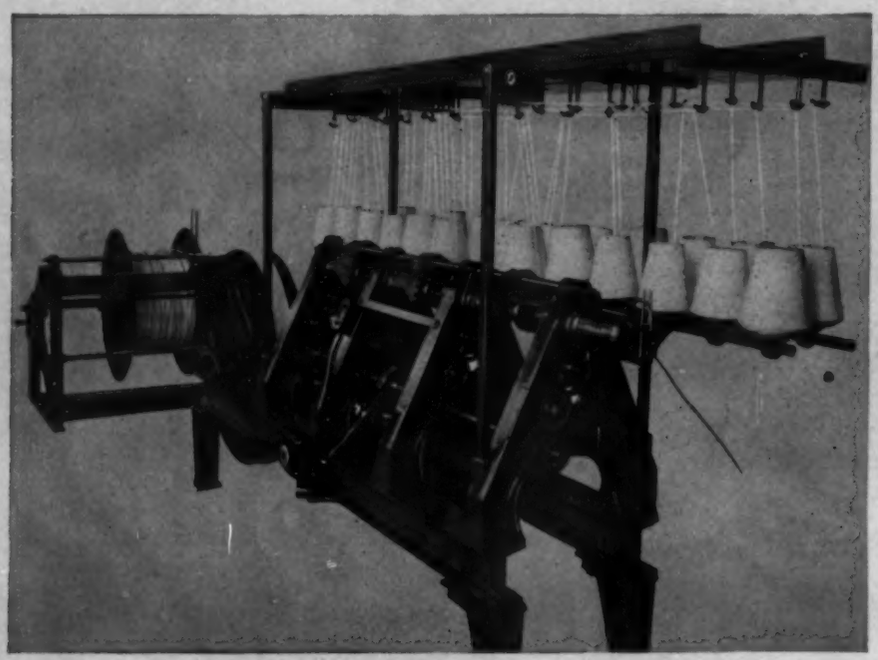
	To July 1, 1943	To July 1, 1942
Escanaba	2,004,661	2,589,939
Marquette	1,252,389	2,067,734
Ashland	1,778,053	2,695,945
Superior	8,597,925	12,098,315
Duluth	5,695,688	8,038,337
Two Harbors	5,348,036	6,271,445
Total, U. S.	24,676,752	33,761,715
Michipicoten	117,138	190,451
Grand total	24,793,890	33,952,166
Decrease from year ago		9,158,276

Warehouse . . .

Warehouse Prices, Page 137

Demand for steel out of warehouse continues heavy in the East with replacements on some products slightly more extended; quotas on the more standard hot-rolled items are generally filled, but with somewhat greater delay. Replacements next month will be based on April sales. Alloy bar demand is largely for cold-drawn and this holds also for carbon. Cold-drawn flats, squares and hexagons are tight. Demand for cold-drawn bar stock is well in excess of quotas with most jobbers.

While larger-size tubing is available from warehouses, aircraft requirements limit the amount in small sizes. Seamless tubing 1½-inch and under is again allowed to warehouses, but the sold-up condition of some mills indicates little will be delivered to distributors before November. Some jobbers in the New York area note a slight decline in the recent strong demand for floor plates. Shapes are moving well. Yards specializ-



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Spec. AN-S-16

NE 8630 COLD FINISHED
Spec. AN-S-14

18-8 STAINLESS COLD FINISHED
Spec. AN-QQ-S-771
Spec. AN-QQ-S-763

SHEETS

18-8 STAINLESS COLD ROLLED
Spec. AN-QQ-S-772

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Seamless Cold Drawn
SAE 4130X
Spec. AN-WW-T-850

Welded Cold Drawn
SAE 4130X
Spec. AN-T-3

BILLETS

SAE 4130X H.F.
Spec. AN-QQ-S-684

NE 8630 H.F.
Spec. AN-S-14

SAE 4340X H.F.
Spec. AN-QQ-S-756

NE 8740 H.F.
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REDI-PAINT renders galvanized surfaces passive, makes them receptive to organic finishes, and permits close bonding with the basic surface.

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6135 South Central Avenue, Los Angeles

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ing in ship repairs are placing fewer rush orders for emergency work, which may reflect the mounting success against submarines.

Nonferrous Metals . . .

Nonferrous Prices, Page 139

New York — Copper allocations for August delivery will be made this week, although fabricators and other consumers filed applications for metal with WPB somewhat later than usual in some instances. Distribution for the second month under CMP is operating smoothly. On the surface pressure for copper appears to have eased, but this is due primarily to improved technique in covering war requirements which continue to absorb the bulk of current production with reserve stocks maintained with insignificant fluctuations.

Influence of CMP is reflected in reduced allocations of copper alloy ingot metal to brass foundries this month. Foundries will not be permitted to make up castings as far ahead; some operating on long-range programs have been making castings months ahead of requirements, which was permissible under high priorities. This has been reduced to 60 days and the first rather sharp cut in allocations developed the first month under CMP. The reduction in August and September will not be as great, for by that time foundries will have got into balance with CMP inventory regulations. Increased production of copper is still pressed for by WPB with the labor situation at the mines a retarding factor.

Galvanizers are getting slightly heavier allocations of zinc this month. Quotas allowed galvanizers has depended mainly on the steel available for coating; there has been little pinch in the volume of zinc available for this use but the tonnage of steel has been limited. However, an increasing number of products entering into war needs require galvanizing and larger zinc allotments indicate more steel will be available for processing. Sellers of prime western are practically sold out for this month, but high grade is available and continues easier. Certificates for zinc are below the tonnage available, but the ratio of the excess is mostly on the high grade side. Some metal is going into stockpiles at government owned ordnance plants.

Wartime economies in the use of tin continue under tight regulation. While outstanding among these are savings in tin mill products through the electrolytic process of coating tin plate, total requirements for that product are higher due to increased operations which will continue through the balance of this quarter and probably will exceed fourth quarter operations of last year. Approximately 2100 long tons of pig tin a month will be required for estimated tin mill production this quarter.

Bulk of the current domestic production of lead is going into consumption. Consumers, expecting to add to reserve supplies during the summer months as a result of lifting inventory restrictions during the period of lightest traffic, will draw largely from foreign ore reserves.

Maximum prices have been placed on a new grade of primary aluminum ingot, 50 to 70 per cent of scrap with the balance primary metal. The prices are for No. 142 primary grade ingot, 15.50c a pound; No. 355 ingot, 15.50c; and No. 195 ingot, 15.00c, effective July 12.

Pacific Coast . . .

Seattle — Expansion of the Pacific Coast shipbuilding industry on a permanent basis is indicated by recent events. This area has been producing about 50 per cent of the tonnage output of the country and in recognition of the excellent record of western yards it is announced that much tanker construction is to be placed with yards in this area. The Kaiser interests soon will start a $5,000,000 alteration and expansion program at the Oregon Shipbuilding plant, Portland, where construction of the new type Victory ships will succeed the Liberty ship type. The Tacoma yard of the Seattle-Tacoma Shipbuilding Co. has been awarded contracts for an unstated number of aircraft carriers for the Navy. Details were not revealed.

The Swan Island Kaiser plant has completed its first year of operation with a record of 27 tanker keels laid, nineteen 16,500-ton tankers launched and 15 delivered. The three Kaiser plants in the Portland-Vancouver area have made it known that 22 per cent of their production workers are women. They now number 20,633 serving as welders,

SPEED UP LAGGING SCHEDULES WITH PSC CARS

1. THEY KEEP PRODUCTION ON THE MOVE

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There's no time for lagging schedules when every bit of war material is so vitally needed on our fighting fronts! PSC Cars keep production on the move by providing dependable haulage on all shifts—eliminating unnecessary time-outs for repairs—reducing maintenance to a minimum!

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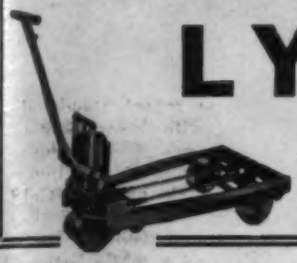

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Wherever pallet handling is concerned, the LYON Way saves effort. First, because LYON Pallet-Trucks operate *Hydraulically*. Second, because they get in and out of cramped quarters quickly. Third, because they guard against jamming under pallets. Fourth, because elevation is ample to clear uneven spots on runways.

Write today for literature on these two vital material handling aids to bigger war production.

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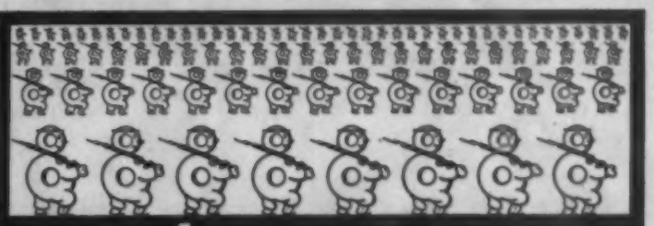

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These car pullers are built by Jones as complete units with motor included if desired, or with base to take standard motor, as supplied by the purchaser. The cable drum is driven by a Jones triple reduction Herringbone speed reducer and the control station may be located at a point to give the operator a clear view of the tracks and spotting positions.

Even in plants where comparatively few cars are handled it has been found that a Jones car puller more than pays its way. Prices and complete information will enable you to judge whether such an outfit might pay out in your plant. Write for complete information.

W. A. JONES FOUNDRY & MACHINE CO.
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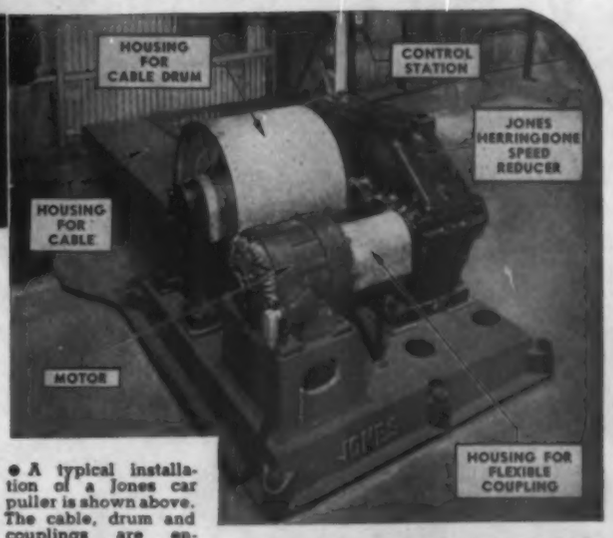

• A typical installation of a Jones car puller is shown above. The cable, drum and couplings are enclosed by sheet metal housings as an extra precaution in this installation to eliminate all hazard from moving parts.

• A complete Jones car puller unit. These outfits are for use with wire rope and are manufactured in a wide range of capacities to suit the number of cars to be handled in each plant.

Jones HERRINGBONE—WORM—SPUR—GEAR SPEED REDUCERS
CUT AND MOLDED TOOTH GEARS • V BELT SHEAVES
ANTI-FRICTION PILLOW BLOCKS • PULLEYS
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operating cranes, working in machine shops, in rigging lofts and in other jobs heretofore filled only by men.

Rolling mills, as well as machine shops, and fabricating plants, report a serious shortage of manpower in the Pacific Northwest. With wages frozen in many plants, the steel industry is unable to compete with the shipyards and other plants where the wage scale is more attractive.

According to John N. Young, manager of the United Engineering & Foundry Co., the second largest aluminum rolling mill in the country is completed at Spokane, with the exception of minor installations of machinery and equipment.

Officials of Bonneville Power Administration state that several comparatively small plants will be required to recover alumina from Northwest clays. WPB is reported to have authorized construction of the first to utilize clays near Molalla, Oreg., and Castle Rock, Wash. The exact location of the proposed $4,000,000 plant in this area has not been announced. Its planned capacity is 30 tons of alumina daily.

Most fabricating capacity is working on war agency contracts. Plants seeking outside business report little demand. Rolling mills have backlogs nearly to the end of the year, most of the order for war purposes. Reinforcing steel output is considerably reduced. There is no call for this item outside of war needs. Merchant bars continue active, consumption by shipyards, for ordnance and railroad equipment being heavy. Following a recent lull in this market, recent placements have given plants work through third and well into fourth quarter. Several fabricating and foundry plants are working entirely on war production.

Wholesale jobbers report steady demand for all items, with government requirements of paramount importance. Plates are exceedingly short and houses are unable to get their quotas. Cold-rolled steel deliveries are below allotments. Sheets are somewhat easier, with improved deliveries, while bars and shapes are in better position than for some time. All items are in strong demand and moving freely.

The scrap situation continues satisfactory. Mills are getting their main supplies from shipyards while heavy stocks of less desirable material are available in storage yards where dealers are processing it as quickly as it is required. The outlook indicates no immediate shortage.

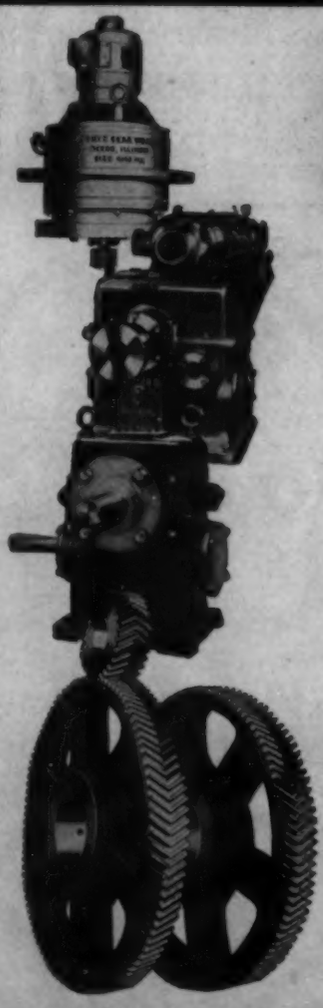
Major projects involving cast iron pipe are delayed, owing to difficulty of obtaining priorities. Potential demand is strong but only emergency jobs are given immediate consideration. Kennewick and Pasco, Wash., faced with an influx of war workers, are planning extended water and sewer system expansions, state engineers recommending filtration and disposal plants for both cities. Orting, Wash., which called bids for 350 tons of cast iron pipe, has purchased transite. H. G. Purcell, Seattle, has taken 350 tons of 24, 16 and 12-inch pipe for the Eighth avenue South project, Seattle. Dealers report better stocks in warehouse and are selling small lots out of reserves.

Judson-Pacific Co., San Francisco, is low to Tacoma for furnishing gantry crane and transformer transfer car for the Alder and LaGrande power houses, second Nisqually project. Figures are $31,863 and $10,692 respectively. Aurora Pump Co., Aurora, Ill., is low for pumps but no tenders were received for valves. John A. Roebling's Sons Co. is reported winner of a substantial contract for a suspension bridge for the Alaska Highway commission.

The fourth section of a large floating drydock for the navy has been launched at Longview by the Puget Sound Bridge & Dredging Co.

The Astoria Marine Construction Co., Astoria, Oreg., has the contract to outfit new navy carrier escort vessels under construction at the Kaiser yards. Work will be done at the Port of Astoria docks under naval supervision.

Brad Foote



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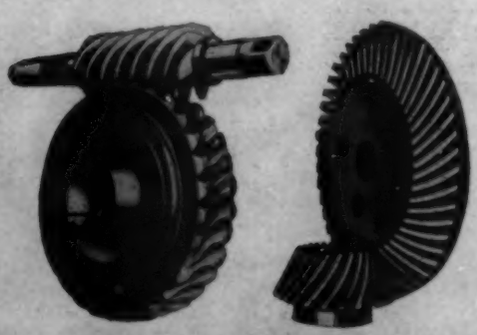

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Bolts, Nuts . . .

Bolt, Nut, Rivet Prices, Page 155

A severe shortage exists in semifinished hexagon nuts, due to difficulty in obtaining cold-drawn bars; also in stud bolts, which only last week, owing to the scarcity in alloys, had been placed on the critical list. Both of these items are used extensively in the assembly of steam lines and other piping in fitting out ships. In fact, it is claimed that this situation is actually holding up delivery of ships at several yards. Difficulty in getting steel for these items, however, is not retarding operations in general at bolt and nut plants, most of which are operating at virtual capacity. Rather,

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Straightening
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the major limitation is shortage of manpower, which is keeping some units from operating extra shifts.

Steel in Europe . . .

London—(*By Radio*)—Steelmakers in Great Britain find the situation much improved as to supply of iron ore and scrap and coke production is sufficient to provide amply for all needs. Heavy demand is being met for all rolled steel products and mills are booked well into the future, plates covering output for at least three months.

Michigan Iron Ore Mines Cut Stockpiles Sharply

Geological survey division of the department of conservation of Michigan reports iron ore mined in 1942 totaled 15,676,874 gross tons and shipments were 16,163,104 tons. Gogebic range mined 4,513,673 tons and shipped 4,691,940 tons; Marquette range, 6,341,273 and 6,540,731 tons; Menominee range, 4,821,928 and 4,930,434 tons. Effect of heavy shipments during the past few years is shown in diminishing stockpiles on the three Michigan ranges. On Jan. 1, 1939, these totaled 5,077,125 tons, dwindling steadily to 1,572,029 tons Jan. 1, 1943.

Number of mines increased from 35 in 1938 to 43 in 1942, average days worked from 157 to 273, average number of employes from 5633 to 8242, average yearly wage from $1192 to $2078 and tons produced per man per day from 5.32 to 6.75. Based on larger output state and local taxes per ton of ore mined declined from 30.85 cents in 1938 to 11.12 cents in 1942.

Specifications for Aluminum Ingots Issued by WPB

War Production Board has issued directive No. P-1, setting forth the specifications for wrought alloy aluminum ingots covered in maximum price regulation No. 2, which permits a maximum ceiling price of 14.50c a pound for 17S, 18S, 32S, and 52S ingot.

The analysis range of the alloys affected, in per cent, follows. Where two figures are given they represent the minimum and maximum amounts of such alloying ingredient permitted. Where one figure is given, it represents the maximum amount of such alloying ingredient permitted:

17S Alloy: Copper, 3.5 to 4.5; silicon, 0.65; iron, 0.75; magnesium, 0.2 to 0.8; manganese, 0.4 to 1; chrome, 0.2; zinc, 0.1, any one other 0.05; total others, 0.15.

18S Alloy: Copper, 3.5 to 4.5; silicon, 0.9; manganese, 0.1; nickel, 1.7 to 2.3; titanium, 0.07; chrome, 0.1; zinc, 0.15; any one other, 0.05; total others, 0.15.

32S Alloy: Copper, 0.5 to 1.3; silicon, 11.00 to 13.5; iron, 0.75; magnesium, 0.8 to 1.3; manganese, 0.1; nickel, 0.5 to 1.3; chrome, 0.08; zinc, 0.15; any one other 0.05; total others, 0.15.

52S Alloy: Copper, 0.1; silicon, 0.3; iron, 0.5; magnesium, 2.2 to 2.8; manganese, 0.1; chrome, 0.15 to 0.4; zinc, 0.1; any other, 0.05; total others, 0.15

Construction Materials Brought Under CMP Control

(*Concluded from Page 75*)

procedure is granted in the case of a delivery order for Class A products on contracts or subcontracts which require less than 1 ton of carbon steel or wrought iron, 400 pounds of alloy steel, 100 pounds of copper and copper-base alloy, or 20 pounds of aluminum. In these cases an order may be placed bearing the applicable allotment number followed by the symbol SO. Persons receiving orders bearing the SO symbol may use it to obtain their own controlled materials requirements.

Persons who have received allotments for authorized construction may place authorized controlled material orders with (1) a warehouse or distributor or (2) with any controlled materials producer, unless otherwise specifically directed.

Authorized controlled materials orders placed under CMP regulation No. 6 must be identified with the following endorsement of the endorsement specified in CMP regulation No. 7, unless another form is specifically prescribed:

"The undersigned certifies, subject to the criminal penalties of section 35-A of the United States Criminal code, that he has received an allotment or allotments of controlled materials (or delivery orders not requiring allotments) authorizing him pursuant to CMP regulation No. 6 to place an authorized controlled material order in the amount herein indicated for delivery in the month specified, and that he is authorized to use the allotment number."

The abbreviated allotment number must be used in the endorsement and it must be followed by the abbreviated quarter identification.

Delivery orders for controlled materials must be placed in sufficient detail to permit entry on mill schedules and if placed with a controlled material producer must be placed sufficiently far in advance to comply with the time limits established in Schedule III of CMP regulation No. 1.

Preference ratings will be assigned to construction at the time allotments of controlled materials are made in order to permit consumers to obtain other than controlled materials and products essential to the completion of the construction.

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USED BY LEADING WAR PLANTS FOR

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When you buy Preformed "HERCULES" (Red-Strand) Wire Rope, you get a Preformed wire rope of the very highest quality . . . not only as to quality of material, but fabrication as well. As it is furnished in both Round Strand and Flattened Strand construction, there is a right rope for every heavy-duty purpose.

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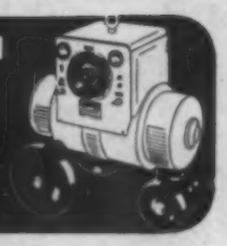

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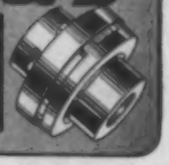

STRUCTURAL SHAPES . . .

SHAPE CONTRACTS PLACED

1665 tons, aluminum extrusion plant, Maryland, to Bethlehem Steel Co., Bethlehem, Pa.

1300 tons, fabricating and erecting, hangar, Mills Field, South San Francisco, Calif., to Bethlehem Steel Co., Bethlehem, Pa., Bureau of Yards and Docks, spec. 11378.

260 tons, dye works for E. I. du Pont de Nemours & Co., at Deepwater Point, N. J., to Belmont Iron Works, Philadelphia.

100 tons or more, 50 diesel locomotive cranes, Bureau of Yards & Docks, to Ohio Locomotive Crane Co., Bucyrus, O., $1,358,140, deliveries as follows: Eleven 35-ton, Boston; six 30-ton, South Boston; twelve 30-ton, Philadelphia; two 30-ton, Puget Sound; sixteen 30-ton, Charleston, S. C., and three 30-ton, Portsmouth, N. H.

100 tons, raising bridge, Tennessee Valley Authority, Knoxville, Tenn., to Fichter Steel Co., New York; Felhaber Pile Co., New York, contractor.

SHAPE CONTRACTS PENDING

Unstated, gantry crane and transformer transfer car for Alder and La Grande powerhouses, Tacoma's second Nisqually project; Judson-Pacific Co., San Francisco, low at $31,863 and $10,392 respectively.

DPC Authorizes Plant Expansion, Equipment

Defense Plant Corp. has authorized the following expansions and equipment purchases (figures are approximate):

Ashland Oil & Refining Co., Ashland, Ky., contract increased to provide additional facilities at a plant in Kentucky, costing $2,500,000, making overall commitment $9,200,000.

Bendix Aviation Corp., South Bend, Ind., for additional facilities at a plant in Michigan costing $85,000, making overall commitment $22,000,000.

Ford Motor Co., Detroit, additional contract for facilities at a plant in Michigan costing $200,000, making overall commitment $1,600,000.

Republic Steel Corp., Cleveland, for additional facilities at a plant in Ohio, to cost $100,000, making overall commitment $29,500,000.

Cochaud Wire Die Corp., New York, contract to provide additional equipment at plant in New York.

Fort Wayne Wire Die Co. Inc., Fort Wayne, Ind., contract to provide additional equipment at plant in Indiana.

Morris Schnitzer, doing business as Schnitzer Steel Products Co., Portland, Oreg., for facilities for a plant in Oregon, costing $50,000.

American Distilling Co. Inc., New York, additional equipment for a plant in Illinois, to cost $75, making overall commitments $825,000.

J. S. Abercombie Co. and Harrison Oil Co., Houston, Tex., for additional facilities at a plant in Texas, to cost $1,100,000, making overall commitment $15,500,000.

Crosley Corp., Cincinnati, to provide additional facilities at plant in Ohio, $450,000.

Ladish Drop Forge Co., Cudahy, Wis., to provide additional facilities at a plant in Wisconsin, $800,000, making overall commitment $9,400,000.

Heckett Corp., Butler, Pa., $200,000 for additional facilities at a plant in Kentucky, making total commitment $1,000,000.

Republic Aviation Corp., Farmingdale, L. I., N. Y., $200,000 for additional facilities at plant in New York state, making overall commitment $17,750,000.

United Aircraft Corp., East Hartford, Conn., $5,250,000 for additional facilities at plant in Connecticut, making overall commitment $11,500,000.

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Write for Bulletin SL 21

CULLEN-FRIESTEDT CO.
1308 S. Kilbourn Ave. Chicago, Illinois

CONSTRUCTION AND ENTERPRISE

OHIO

BARBERTON, O.—Barberton Foundry Co., 1971 Huston street, is expanding facilities by addition of a building 20 x 25 feet.

CLEVELAND—Bissett Steel Co., George Bissett, president and treasurer, will build a warehouse and office building at 945 East Sixty-seventh street as soon as priority approval is obtained. The warehouse will be one-story 26 x 80 feet and the office two-story 24 x 50 feet. Total cost is estimated at $25,000.

CLEVELAND—Hertner Electric Co., 12609 Elmwood avenue, Cyrus C. Dash, president, has been granted permit for a one-story storage building, 42 x 79 feet, to cost about $4000.

CLEVELAND—Maurath Co. Inc., George Maurath, president, 7309 Union avenue, has let contract for one-story 120 x 260-foot factory building to Albert M. Higley Co., 2036 East Twenty-second street. Estimated cost $125,000. H. M. Morse Co., 1500 East Superior avenue, is engineer.

ELYRIA, O.—Elyria Plating Inc., 120 Olive street, is building an addition, one story, 30 x 100 feet, to house finishing, shipping and other facilities, at cost of about $9000.

ELYRIA, O.—Elyria Machine Products Co., recently incorporated, has started production of airplane parts. The company is operating in conjunction with the DeBray Auto Body repair shop, 115 Cedar street, Herbert J. DeBray is president and general manager.

EUCLID, O.—Cleveland Wire Works division of General Electric Co., 1331 Chardon road, has let contract to James C. F. Shafer Co., Caxton building, Cleveland, for factory additions 120 x 270 feet and 43 x 43 feet and a storage building 100 x 140 feet. Cost is estimated at $200,000.

MICHIGAN

BAY CITY, MICH.—Bay City Freezer Co. has let contract to Charles Englehardt Construction Co., 404 Shearer building, for an addition to its plant at 1215 North Johnson street.

DETROIT—Precision Mfg. Co., 2826 David Stott building, has been incorporated with $100,000 capital by George H. Lenuk, 15775 Ward street, Detroit, to deal in tools, dies, jigs, patents, etc.

DETROIT—Michigan Rust Proof Co., 2128 Jos. Campau avenue, has let contract to Bryant-Correll Inc. for alterations to plant at that address.

DETROIT—Aluminum Co. of America has let contract to Malcomson, Calder & Hammond, architects, 1219 Griswold street, for plans for addition to extrusion plant addition at 3311 Dun road, Detroit.

DETROIT—Packard Motor Car Co. has awarded several contracts for additional facilities. Barton-Malow Co., 2631 Woodward avenue, has been given contract for 32-test-cell addition to building No. 84-B, 1580 East Grand Boulevard; Bassler-Carter Co., 8550 Lyndon avenue, has been given contract for test cell services in same structure; Barton-Malow Co., has received contract for a normalizing furnace in building 63-A, 1580 East Grand boulevard.

ILLINOIS

HARVEY, ILL.—Ingalls-Shepard Division of Wyman Gordon Co., 146th and Wood streets, has had plans prepared by Schmidt, Garden & Erikson, 104 South Michigan avenue, Chicago, for a one-story plant building costing over $1,000,000, federally financed.

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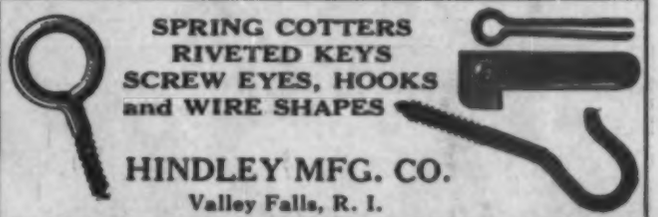

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MARYLAND

BALTIMORE—Anchor Post Fence Co., 6500 Eastern avenue, has let contract for a test house in connection with its plant.

BALTIMORE—Murray Corp., Towson, Md., processor of wire products, is erecting an addition to enlarge production.

BALTIMORE—Baltimore Steel Drum Co. Inc., 1543 Ridgley avenue, is erecting a one-story plant addition for reconditioning of metal containers, the second expansion this year.

BALTIMORE—Glenn L. Martin Co., airplane manufacturer, Middle River, Md., has leased two floors of the Industrial building, 501 East Preston street, containing about 57,000 square feet.

BALTIMORE—Revere Copper & Brass Inc., 1300 Wicomico street, has let contract for a carpenter and box shop at 301 Wicomico street.

BALTIMORE—Gilbert Cummins Co., 505 Water street, electroplater, has acquired a plant at 2700 Frederick avenue which will be remodeled for a branch plant, one story, about 5000 square feet.

BALTIMORE—Davison Chemical Corp., 20 Hopkins place, with plant at Curtis Creek, Md., has awarded contract for a new pump house, with additional fuel oil storage facilities and piping system.

GEORGIA

SAVANNAH, GA.—Webb Electric Co., Anderson, S. C., has contract for plant modifications and additions to boiler plant and steam distribution system in Houston county for United States engineers, Savannah. Cost estimated at $50,000.

TENNESSEE

CHATTANOOGA, TENN.—Converse Bridge & Steel Co., 2418 Vance avenue, is having plans prepared for a plant addition of concrete and sheet steel.

MINNESOTA

BROWERVILLE, MINN.—Todd County Dairy Co-Operative will let contract soon for a milk dehydrating plant, to cost about $90,000. Klinger, Hubbard & Gohn, 218 South Barstow street, Eau Claire, Wis., are engineers and architects.

IOWA

BOONE, IOWA—George A. Nelson, city engineer, is preparing plans for an elevated steel water storage tank and other water system improvements, to cost about $75,000.

INDIANOLA, IOWA—City plans erection and equipping a municipal power plant to cost about $75,000. V. E. Knight, city engineer, is in charge.

NEWTON, IOWA—Maytag Co. has let contract to Arthur H. Newmann & Bros. Inc., Hubbell building, Des Moines, Iowa, for a plant addition to cost about $150,000.

WHITECASTLE, IOWA—E. J. Hebert has had plans prepared for a frozen food locker building, with complete equipment.

OREGON

HERMISTON, OREG.—F. B. Sargent, Hermiston, is low at $48,000 and has been recommended for the award, to build pumphouse and install additional water system facilities. Plans are by R. H. Corey, Portland, Oreg.

PORTLAND, OREG.—Ross B. Hammond Co. has been awarded contract to build a $150,000 concrete plant addition for Northwestern Ice & Cold Storage Co., 100 x 200 feet, at Washington and Waters streets.

PORTLAND, OREG.—Langville & Peterson Inc., machine tool manufacturer, will build a plant addition 97 x 148 feet, to house shops, shipping department and offices, at SE Seventeenth and Linn streets. Contract has been let to George H. Buckler Co.

WASHINGTON

SEATTLE—North Pacific Shipbuilding Co. has increased its capital stock to $112,000 to provide for increased volume of business.

SEATTLE—Hydraulic Supply Co., 7500 Eighth avenue South, is building an extension to its plant craneway.

TACOMA, WASH.—Nelson Boiler & Tank Co. Inc., 401 Milwaukee road, has increased its capital stock to $50,000.

VANCOUVER, WASH.—Wegman & Son has been given contract for a maintenance building at the Kaiser shipyards here, plans by Wolff & Phillips, Portland, Oreg. Building will be 70 x 180 feet, of plywood, similar to other plant structures.

CANADA

BRANTFORD, ONT.—Brantford Public Utilities Commission, 32 Queen street, W. R. Catton, manager, plans construction of repair shop to cost, with equipment, about $15,000.

CHIPPEWA, ONT.—Horton Co. plans to start work soon on construction of plant addition here to cost, with equipment, about $400,000.

CREIGHTON MINES, ONT.—International Nickel Co. of Canada Ltd., Copper Cliff, Ont., has given general contract to Carrington Construction Co., Whittaker and Douglas streets, Sudbury, and also placed sub-trades in connection with plant addition here to cost $75,000.

GODERICH, ONT.—Dominion Road Machinery Co., East street, C. W. Attridge, president, has purchased former aircraft factory here from Town Council, and will remodel it and install equipment for manufacturing purposes. Estimated cost, with equipment, about $30,000.

FORT WILLIAM, ONT.—Canadian Car & Foundry Co. Ltd., has given general contract to Claydon Co. Ltd., 253 St. Anne's road, Winnipeg, Man., for construction of plant addition here to cost about $30,000. C. D. Howe Co. Ltd., Public Utilities building, Port Arthur, are consulting engineers.

HAMILTON, ONT.—The Dominion government, through the Department of Munitions and Supply, Ottawa, has acquired a 17-acre site here from the Harbor Commission, where it will erect a plant for finishing and equipping corvettes built in shipyards at Toronto, Collingwood, Kingston, Midland, Port Arthur and other points in Ontario.

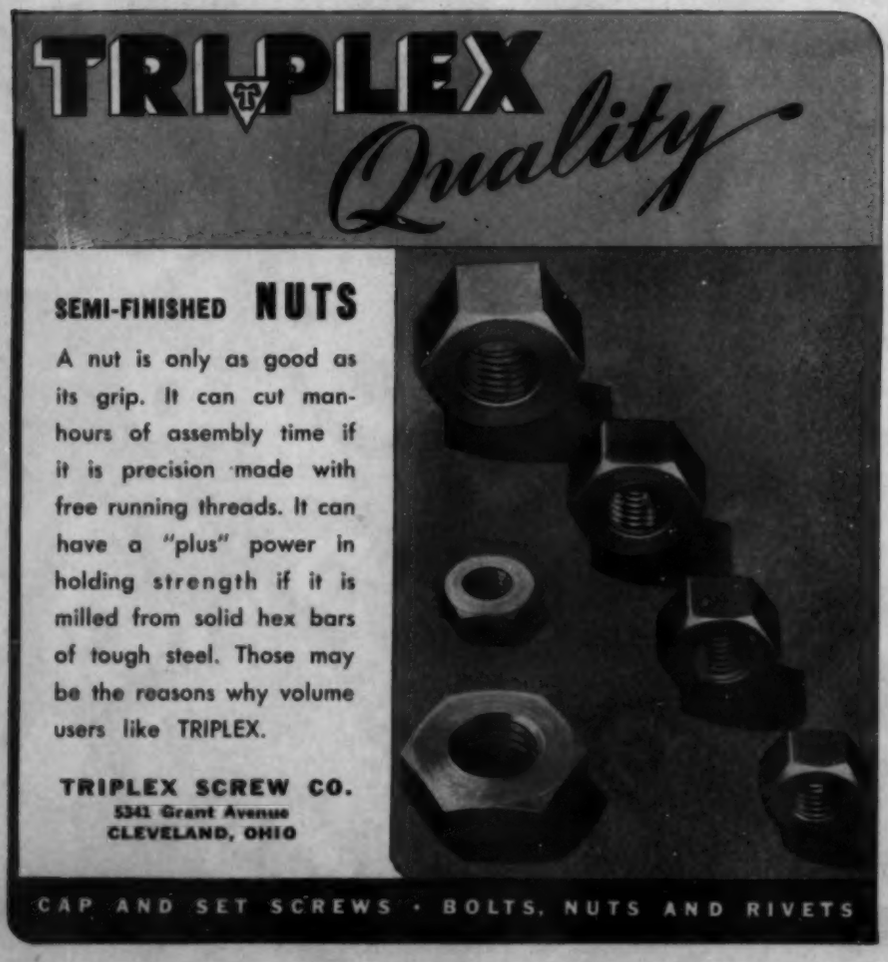
LEASIDE, TORONTO, ONT.—Research Enterprises Ltd., Eglington avenue East, has given general contract to Milne & Nicholls Ltd., 57 Bloor street West, for new plant addition to cost, with equipment, about $50,000.

WOODSTOCK, ONT.—Canada Casters Ltd., W. Ball, manager, plans construction of plant addition, estimated to cost, with equipment, about $25,000.

MONTREAL EAST, QUE.—Canada Strip Mill Ltd., Durocher street, has given general contract to Carter-Halls-Aldinger Co. Ltd., 419 Cherry street, Toronto, for construction of plant addition to cost about $100,000.

MONTREAL, QUE.—Harrington Tool & Die Co. Ltd., 201 First avenue, Lachine, has had plans prepared by Gratton D. Thompson, architect, 2049 McGill College avenue, for construction of plant addition one story, 35 x 81 feet, to cost, with equipment, about $30,000.

MONTREAL, QUE.—J. & R. Weir Ltd., 33 Nazareth street, boilers, etc., has given general contract to James Thom & Co. Ltd., 660 St. Catharine street West, for construction of welding and storage shop on Prince street, to cost $50,000. Plant to be occupied by Welding Engineers Ltd., a subsidiary company.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STRAIGHTENER, Tube Torrington 1/4"-5/8" O.D.
STRAIGHTENER, Plate 12-roll H&J, 84"x1/4", M.D.
TURRET LATHE, 3-A W&S, H.S. 3 11/16", S.P.D.
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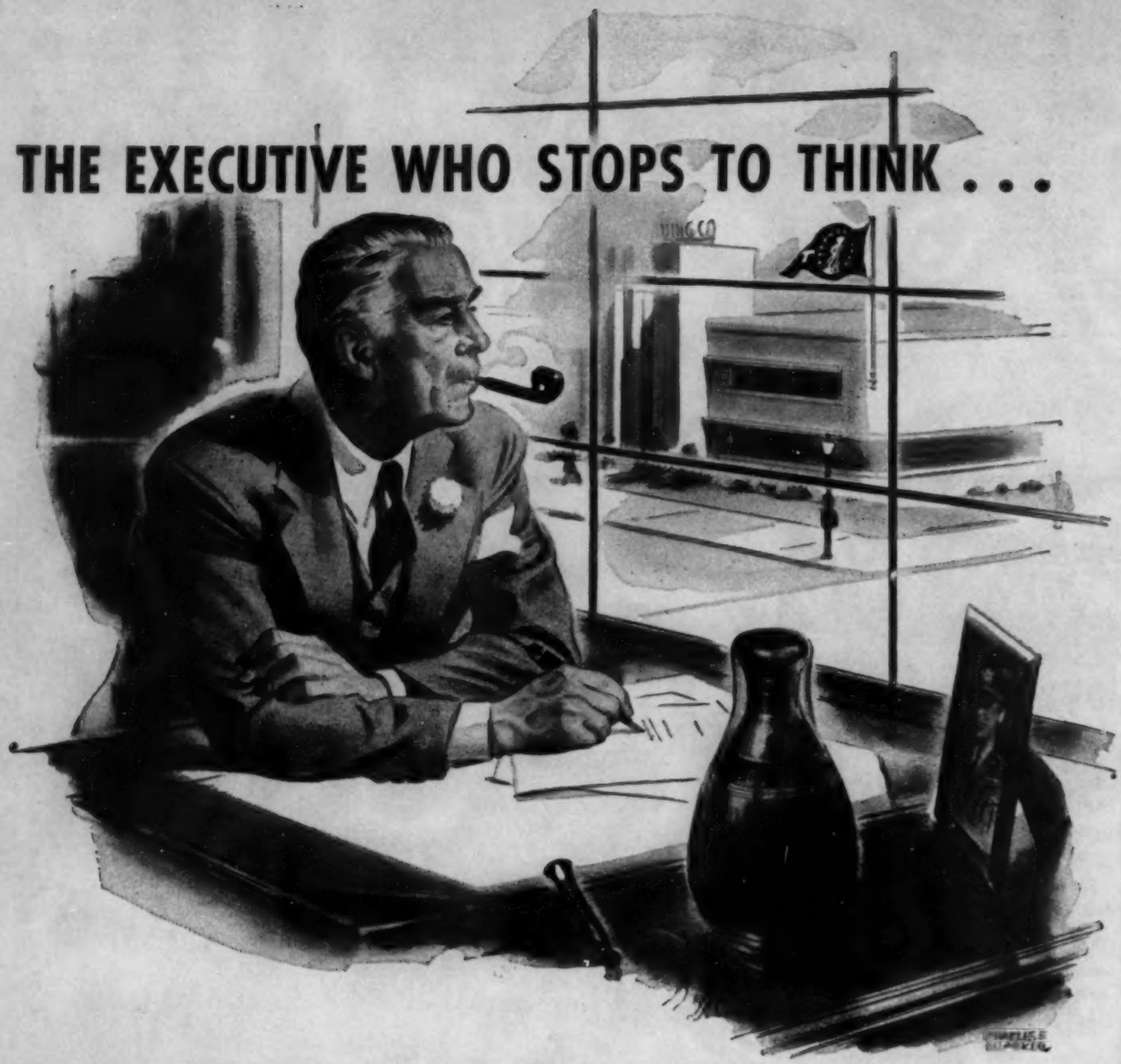

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For details get in touch with your local War Savings Staff which will supply you with all necessary material for the proper presentation of the new plan.

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This space is a contribution to America's all-out war effort by

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. . . now do your best!

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#2005

STEEL

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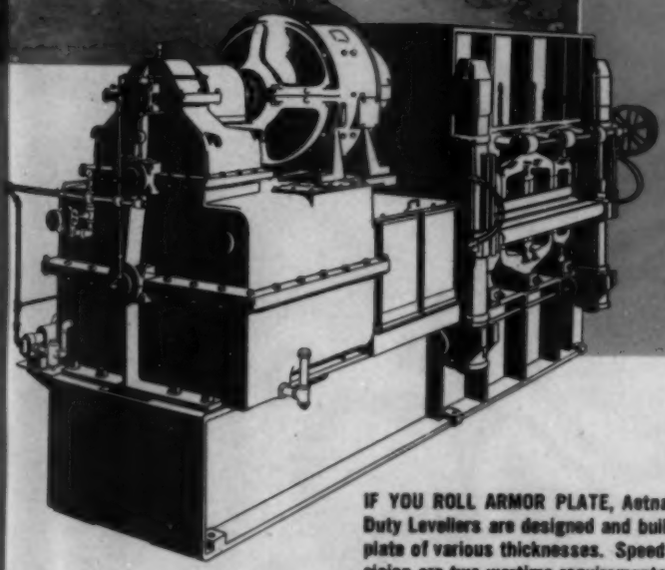
HISTORY IN THE MAKING

Four ships a day! Impossible, yet accomplished by a Democracy and a System that the Axis would have us believe is decadent. America, never an outstanding maritime nation, has risen, magnificently, to the demand for ships and more ships. Merchant ships, escort destroyers, battlewagons, cruisers, submarines, PT boats, auxiliary vessels are sliding down the ways in ever increasing tempo . . . thus we are winning the battle of transport and supply.



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ARMY (E) NAVY

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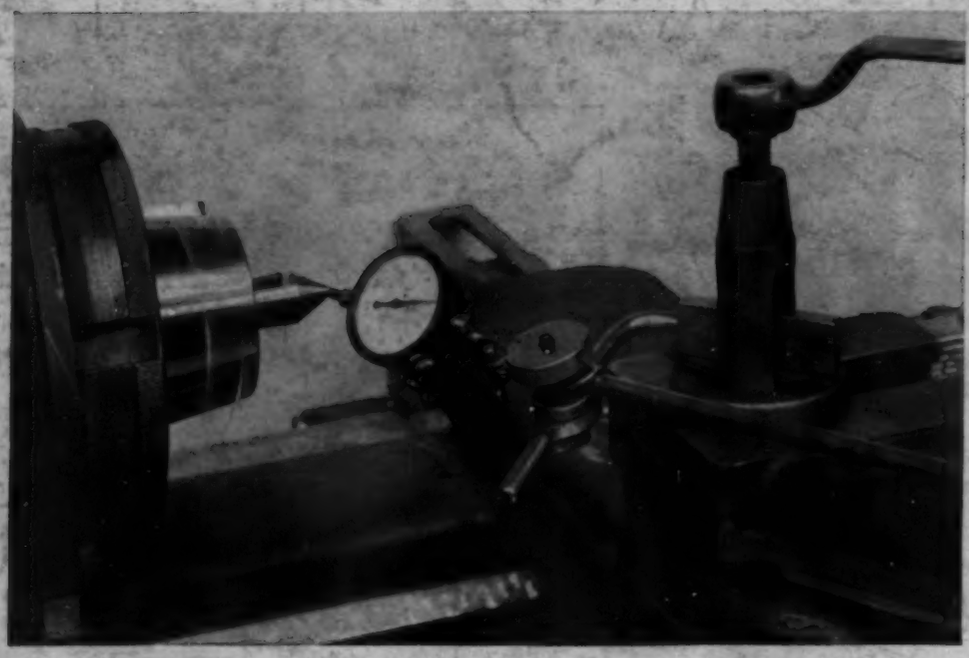
No. 11 in a series of tips on "Keeping 'em Turning" by Arthur Edwards — 41 years at LeBlond

I'm tellin' you

"A straight line is the shortest distance between two poi
That's the way your lathe spindles should run to turn o
good job — in a straight line. Centers can get out of wh
even the best of them, under continued hard use. We c
"run-out" when the headstock center rotates out of line

"Run-out" shows up easily if you use a dial type indic
measuring in thousandths of an inch. Here's how to de
and correct it.

Mount the dial indicator on the tool post with the point against the angle of the lathe center. Fluctuation of the needle when the spindle is turning indicates "run-out". Three things may be responsible.



1 — Most likely to be the fault is the presence of dirt or chips in the taper hole between spindle and center bushing or between center bushing and the center itself. Remove the center and center bushing and clean the taper holes in the spindle and center bushing and the outside of both center bushing and center.

2 — A second source of trouble may be a burr or scratch on the surface of the spindle taper hole or the center bushing. Since the center bushing is hardened, the burr is most likely to be in the spindle hole. In this case, remove the high spot with a scraper or use a Morse taper reamer of appropriate size.

3 — Third cause of "run-out" is inaccur
of the center point itself. Soft cen
can be trued up by setting the compo
rest at 30 degrees with the axis of
lathe and taking a skim cut with a sh
tool. Hard centers require grinding.
a tool post grinder or a LeBlond grind
attachment, mounted at 30 degree an

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